GEOTECHNICAL EXPLORATORY WORK
AND RELATED SERVICES FOR
VARIOUS LOCATIONS IN NEW ENGLAND
SUBMITTED TO:
NEW ENGLAND DIVISION CORPS OF ENGINEERS

JULY 15, 1985

STONE & WEBSTER ENGINEERING CORPORATION

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New England Division, Corps of Engineers
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W.O. 536.218.1

GEOTECHNICAL EXPLORATORY WORK AND RELATED SERVICES, VARIOUS LOCATIONS IN NEW ENGLAND

Stone & Webster Engineering Corporation (SWEC) is pleased to submit this proposal in response to your solicitation DACW33-85-R-0006, dated June 14, 1985 for geotechnical exploratory work.

SWEC's experience in civil works projects and geotechnical engineering dates back to the turn of the century. SWEC currently has over 50 geotechnical professionals in its Boston headquarters, as well as a fully equipped geotechnical laboratory. SWEC's staff is fully experienced in all aspects of geotechnical engineering including site studies and exploration, instrumentation, laboratory and in-situ testing, and the development of reports.

SWEC has selected Guild Drilling Company, Inc. of Providence, Rhode Island, to be a subcontractor, to provide the exploratory drilling work. Guild is the largest soil and drilling company in New England and has worked for SWEC in a similar capacity on numerous projects. GEOD Corporation, with a local office in Boston, will be SWEC's subcontractor for surveying work. GEOD is one of the most advanced firms in the field of photogrammetric, hydrographic, and oceanographic surveys. Please refer to Section 1 for additional discussion of our project approach.

Section 2 tabulates SWEC's subsurface investigation, geotechnical instrumentation, and geologic experience that includes extensive experience throughout New England. Guild and GEOD's experience record is also contained in Section 2.

The combined personnel resources of SWEC, Guild Drilling Company, and GEOD will provide NED with a highly experienced team in all aspects of geotechnical exploration. Dr. J. Lyndon Rosenblad, the proposed Project Manager, has more than 20 years of geotechnical experience and the proposed geologists and geotechnical inspectors average over 10 years of experience. In addition to these personnel, whose resumes are shown in Section 3, SWEC can draw upon 50 geotechnical personnel located in our Boston Headquarters office. Guild Drilling Company has over 20 drillers with extensive experience in New England, and GEOD has nearly 30 personnel in the disciplines of surveying, photogrammetry, hydrographic surveying. Resumes for both Guild and GEOD personnel are shown in Section 3.

The combined personnel and equipment resources of SWEC, Guild, and GEOD will be more than sufficient to provide five drill rigs and crews. Section 4 contains a description of the available list of equipment.

As indicated in Section 5, SWEC has a well established corporate safety program that has resulted in one of the best safety records in the industry. SWEC, located next to South Station, is within 10 miles of the NED's Waltham's office.

Section 6 delineates past experience with NED, Section 7 indicates that SWEC has not had any contract awards from NED within the last five years, and Sections 9, 10, and 11 contain the Solicitation, Offer, and Award Form; Cost Forms; and Representations and Certification, respectively.

In summary, SWEC has assembled a highly qualified team that has ample resources to undertake the NED geotechnical exploration program. SWEC looks forward to working with you on this important project. If you have any questions or desire additional information, please contact Mr. Edward C. Morris at 589-5305 or the undersigned at 589-2664.

Very truly yours,

M. A. Rosen
Vice President

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SECTION 1

SCOPE OF SERVICES

Stone & Webster Engineering Corporation (SWEC) and our subcontractors are extremely well-qualified to perform geotechnical exploration services for the Corps of Engineers, New England Division (COE-NED). SWEC's Project Manager for this contract will be Dr. J.L. Rosenblad, Assistant Chief Engineer of SWEC's Geotechnical Engineering Division. Dr. Rosenblad has more than 20 years of experience in geotechnical engineering, including field explorations and managing both large and small projects.

SWEC has a long history of maintaining a well qualified staff of geotechnical personnel who develop and carry out subsurface investigations for design of shoreline structures, foundations for power plants, dams, tunnels and other heavy and light industrial facilities. This experience is both in New England as well as other areas of the United States.

The Guild Drilling Company, Inc., of Providence, Rhode Island, will provide the exploratory drilling work required by COE-NED. The Guild Drilling Company is the largest soil and rock drilling company in New England, and also enjoys a reputation for outstanding performance. Mr. C.L. Guild, President of the Company, has received numerous awards in recognition of his professional contributions to the geotechnical engineering community. SWEC has successfully worked with the Guild Drilling Company on several recent exploratory programs in New England. This relationship will enhance the performance of the project team. Because the Guild Drilling Company has the largest drilling equipment inventory in New England, its geographic location, response time and capabilities are ideally suited to this type of project.

Both SWEC and Guild Drilling are experienced in making large diameter and deep borings; angle borings; oriented core borings; offshore borings; installation of piezometers and inclinometer casing, as well as other instrumentation; and obtaining thin wall tube samples. Both organizations have depth with respect to personnel resources who would be available to perform the required services in a timely manner.

Surveying services will be provided by SWEC's subcontractor, the GEOD Company, of Boston, Massachusetts. GEOD specializes in providing surveying services that include but are not limited to, topographic surveys and precision ground control surveys. The GEOD Company has extensive experience on a wide variety of projects, as described in Section 2, Corporate Experience.

All work would be performed under SWEC's established Quality Assurance Program to assure that accurate and complete records are obtained. In addition, all work, particularly field work, will be performed in accordance with safety guidelines established by SWEC and its subcontractors.

Special Drilling Techniques

In order to accomplish the drilling of 8 inch diameter holes up to 150 feet in depth as required under Item 22, we propose to use a Becker drill. This drill is capable of drilling up to a 45 degrees angle and in alluvial formations. Additional information regarding the operation and performance of this drill will be furnished upon request.

SECTION 2

CORPORATE EXPERIENCE

2.1 STONE & WEBSTER ENGINEERING CORPORATION

Recent Subsurface Investigation Experience

Stone & Webster has developed and implemented numerous subsurface investigation programs both in New England and throughout the United States. This work includes specification preparation, field supervision and boring log preparation, laboratory testing, and report preparation. This work is performed in accordance with written procedures as part of an established Quality Assurance Program which assures that accurate and complete records are obtained.

Projects have ranged in size from site feasibility studies to design boring programs for large power plants. Personnel are experienced in supervision of the drilling, both vertical and angled, and sampling activities including undisturbed tube sampling and rock coring as well as performing field tests including vane shear, in place density and pressure and borehole permeability tests. Work has been performed both on land and offshore, and has included installation of piezometers, inclinometer casings, load cells, earth pressure cells, and extensometers.

The following three tables provide an overview of SWEC's subsurface investigation experience. Table 2-1 provides a listing of recent projects where SWEC directed the exploratory program in the field. This listing includes an abbreviated scope, soil or rock description and structure type. Table 2-2 provides a representative listing of piezometer and inclinometer casing installations, including a brief description of the instrumentation. Table 2-3 presents a representative listing of experience in areas with glacial geology.

TABLE 2-1

STONE & WEBSTER SUB-SURFACE INVESTIGATION EXPERIENCE
(1974-1984)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Patriot Gen. Station Indianpolis Power & Light Company 1977,1980	Patriot,IN	Test Borings - 96 Test Pits - 16 Piezometers - 36 Well Test Water Quality Monitoring Wells - 2 Regional Geologic Study Site Geological Reconnaissance Site Geologic Study Seismicity Evaluation Laboratory Test Program	Alluvium Clay Till Outwash Limestone	Power Plant Solid Waste Disposal Waste Ponds	Undisturbed Sampling Chemical Analysis of Water
Patriot Gen. Station Indianpolis Power & Light Company 1979	Patriot,IN	Test Borings - 16 Onshore 26 Offshore Laboratory Test Program	Alluvium Outwash Limestone	Waterfront Structures Unloaders Barge Slip Mooring Area Intake Discharge	Undisturbed Sampling
Salem Harbor Station New England Power Service Company	Salem,MA	Test Borings - 30 Onshore 2 Offshore Piezometers - 8	Misc.Fill Organic Soils Marine Clays Glacial Till	Sheetpile Bulkhead Mooring Facilities	Undisturbed Sampling

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
1976,1977		Inclinometers - 4 Site Geology Underwater Inspection Laboratory Test Program	Gabbro and Diorite	Rock Anchors	Chemical Analysis of Water
Rio Dam Orange & Rockland Utilities 1981,1982	Lumberland,NY	Test Borings - 16 Test Pits - 12 Piezometers - 2 Geophysical Refraction Survey Laboratory Test Program	Alluvium Clay Till Shale Sandstone	Surface Penstock Replacement and Landslide Study	Undisturbed Sampling
Newman Power Station El Paso Electric Company 1973	El Paso,TX	Test Borings - 40 Test Pits - 6 Seismicity Evaluation Laboratory Testing	Loess Caliche Alluvium	Power Plant and Waste Ponds	Collapsible Soils
1982		Test Borings - 12 Laboratory Test Program	Loess Caliche Alluvium	Solar Power Plant	Preliminary Engineering Study Collapsible Soils

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
NEP 1&2 New England Power Company	Charlestown, RI	Test Borings - 88 Test Pits - 20 Piezometers - 25 Well Test Geophysical Refraction Survey Geophysical Reflection Survey Offshore Magnetomite Survey Site Geological Reconnaissance Site Geological Study Regional Geological Study Radiometric Age Dating Mineralogical Analysis Seismicity Evaluation Thin Section Analysis Laboratory Test Program - Soil and Rock	Outwash Glacial Till Granite Biotite Gneiss Granite Gneiss Pegmatite	Nuclear Power Plant	Liquefaction Analysis

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
PFB Pilot Plant Curtiss-Wright Corporation 1976,1978	Wood-Ridge, NJ	Test Borings - 17 Piezometers - 1	Miscellaneous Fill Glacial Till Sandstone	Power Plant	–
Mystic Station Wastewater Treatment System Boston Edison Company	Everett,MA	Test Borings - 36 Piezometers - 4 Water Quality Monitoring Wells - 6 Laboratory Testing Groundwater Investigation	Miscellaneous Fill Organic Silt Peat, Clay, Sand and Gravel	Wastewater Holding Ponds and Various Waste Treatment Facilities	
Lovett Gen. Station Orange & Rockland Utilities	Tomkins Cove NY	Test Borings - 10 Piezometers - 3 Groundwater Monitoring Wells - 3 Laboratory Testing Groundwater Investigation	Rock, Quarry Spoil, Quarry Wash Sediments Silt, Clay and Rock Fragments	Solid Waste Disposal Facilities	
Mystic Station Units 4, 5, and 6 Coal Conversion Boston Edison	Everett, MA	Test Borings - 12 Laboratory Testing	Miscellaneous Fill, Organic Silt, Peat, Clay, Sand	Power Plant Coal Conversion Facilities - Coal Piles Waterfront	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Company				Docking Facilities Precipitators Chimney	
New Boston Station Units 1&2 Coal Conversion Boston Edison Company	South Boston,MA	Test Borings - 12 Laboratory Testing Environmental Borings - 8	Miscellaneous Fill, Glacial Fluvial Deposit, Clay, Silt, Sand, and Gravel, Rock	Power Plant Coal Conversion Facilities Coal Piles, Waterfront Docking Facilities, Chimney Precipitators FGD Building Coal Handling System Ash Handling System	
Danskammer Point Gen. Station Central Hudson Gas and Electric Corp.	Newburgh, NY	Test Borings - 12 Groundwater Monitoring Well - 5 Laboratory Testing	Glacial Fluvial Deposits - Silty Sand, Clayey Silt, Sand, and Gravel	Solid Waste Disposal Facilities Coal Piles	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
ONWI Permian Basin Project 1981 - Present	Palo Duro Basin,TX	• Siting a nuclear waste repository in bedded salt • 8 deep test wells 3,000 ft-9,000 ft • Continuous 4 in. core • Mud program • Mud logging • Geophysical Well Logs • Drill Stem Tests (DST) • Long-term Pump Test and Formation Sampling • Four Shallow Water Wells to 1,000 ft± • Well Design (casing and cementing)	Surface-to-Basement - Sedimentary - - Concentrated Coring and Testing in Salt Section	Nuclear Waste Repository	
Florida Power & Light Co. 1980	Sanford, Manatee, and Martin Power Stations, FL	• Over 500 Shallow (<100 ft) Soil Borings • Obtain Data for Embankment Stability Analysis and Design of Drainage System • Piezometers • Obtained Subsurface Information to	Soil	Dams Fossil Power Stations	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
		Determine Cause of Failures of Embankment • Large Dewatered Test Pit (50 ft x 50 ft) • Cement Grouting • Undisturbed Piston Sampling			
Great Northern Paper Maine 1979	Caumogomac Dam	Ten Test Pits in Proposed New Dam Foundation and to Locate Borrow Areas (soil) for Dam Construction	Soil (Till)	Dam	
Seboyeta Adit Public Service Company of New Mexico 1979	Seboyeta Canyon, NM	Overcore Stress Measurement Tests in Test Adit	Shale	Hydro-Pump Storage Project	
Patriot Fossil Power Station Indianapolis Power & Light Company 1979	Ohio River OH	• Subsurface Investigation for Docking and Unloading Facilities • 25 Onshore and Offshore Borings	Soil and Rock	Fossil Power Station	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
		• Undisturbed - Stationary Piston-Type Sampling • Piezometers • Undisturbed River Bottom Samples			
New Haven & Stuyvesant Power Stations NYSEG 1978	Upstate New York	• Four Oversized Borings • Conducted Sub-surface in-situ Stress Measurement Program using Overcore Technique	Sedimentary Rock(Shales, Sandstone)	Nuclear Power Station	
J. A. FitzPatrick Power Station PASNY 1977-1978	Upstate New York Oswego, New York	Several Large Trenches Detailed Geologic Mapping of Soil Profile and Rock Surface Across Fault	Soil (Outwash and Till) and Bedrock Surface	Nuclear Power Station	
Rock Island Second Powerhouse PUD #1 - Chelan County, Wash. 1972-1976	Columbia River, Washington	• Test Borings (Onshore and Offshore) - 200 • Test Pits - 100 • Piezometers - 50 • Underwater Inspection (TV and Submarine)	-	-	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
		• Relief Wells • Grouting (Foundation and Cutoff) • Anchors (Foundation and Slope Stability)			
Surry Power Station Units 3 & 4 Virginia Elec. & Power Co.	Surry, VA	Test Borings, Standard Penetration Tests and Core Penetrometer Tests to Evaluate Vibr Flotation Test Compaction Program	Alluvium	Power Plant	
Brayton Point Coal Conversion New England Power Service Company	Somerset,MA	Approximately 25 Test Borings. Standard Penetration Tests, Undisturbed Sampling, Rock Coring	Miscellaneous Fill Organic Soils Glacial Till Phyllite	Precipitators Dewatering Bins Ash Settling Basins Ash Silos Fans	
Atmospheric Fluidized Bed Pilot Plant Tennessee Valley Auth.	Paducah, KY	Nine Test Borings Standard Penetration Tests, Undisturbed Sampling	Loess and Alluvium	Boiler, Baghouse, Chimney	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Bridgeport Harbor Coal Reconversion The United Illuminating Company	Bridgeport, CT	Ten Test Borings Standard Penetration Tests Undisturbed Sampling, Vane Shear Tests	Miscellaneous Fill Soft Clayey Silt Dense Sand	Coal Yard Stability Study, Miscellaneous Structures	
Somerset Station Coal Conversion Eastern Utility Associates	Somerset, MA	21 Test Borings Standard Penetration Tests Rock Coring Rock Anchors Groundwater Observation Wells	Miscellaneous Fill Glacial Till Phyllite	Coal Yard, Precipitator, Ash Dewatering Bins and Surge Tank	
New Boston Station Coal Conversion Boston Edison Company	Boston, MA	23 Test Borings Standard Penetration Tests Undisturbed Samples Rock Coring Environmental Samples of Harbor Bottom Sediments	Miscellaneous Fill Soft and Stiff Clay Glacial Till Argillite	Coal Yard, Marine Structures	
Land Treatment Facility, Yorktown Refinery AMOCO Oil Company	Yorktown, VA	Eight Test Borings SPT Undisturbed Samples	Clayey Sand and Sand	Facility for Land Application and Treatment of Refinery	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
				Waste Products	
Millstone 3 NUSCo	Waterford, CT	75 Borings (Onshore & Offshore) Cross-Hole (Explosive & Impact) Refraction Survey Reflection Survey Standpipe Piezometers Geologic Mapping of Excavations Dynamic Triaxial Testing Resonant Column Tests Rock Joint Direct Shear Test Seismicity Study Age Dating of Faults X-Ray Diffraction	Basal Till over Gneiss	Nuclear Power Plant	
Martin, Manatee Sanford Cooling Ponds	Florida	Test Borings Piezometer Installations Site Inspections Underwater Inspections TV Inspection of Buried Pipelines	Sand	Cooling Pond	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Danskammer Coal Reconversion	Newburgh, NY	Borings Groundwater Monitoring Wells Borehole Permeability Tests Constant Head (Lab) Perm. Consolidated Undrained Triaxial Consolidation Tests Undisturbed Sampling	Sandy Silt Clay Grav. Sand Rock	Solid Waste Management Facility	
Malakoff Gen. Station Houston Power & Light Co. 1981	Malakoff, TX (East Texas) (60 Miles SE of Dallas)	104 Soil Borings 54 Soil Borings 10 Piezometers Energy Calibration Test Pressure Meter Tests Seismic Cross-Hole Survey	Clay and Sand	Power Plant Landfill	Main Plant and Coal Handling Material Handling (Stabilized Sludge) Consolidation, Grain Size, Limits UU Tests Lab.
Sondrestrom Air Base, Sondre Stromfjord, Greenland 1979	Greenland	California Bearing Ratio Test - 10* Test Pits - 10*	Granular Fill Base, and Sub-base -3 in.to -200	Runway Improvement	Air Field Overlay

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Wyodak Gen. Station 1975-1976	Gillette, WY	Soil Borings - 10-15 Piezometer - 1 Test Pits - 6	V.F.Grain Silty Sand, Clay	Coal Handling for Power Plant	Pumping Station Excavation Dewatering Impervious Fill Investigation
Northfield	Mass.	Rock Borings Mapping Seismic Surveys Soil Borings, Test Pits	Granite Gneiss/ Glacial Till	Dam, Tunnels Underground P.H.	Rock Borings mainly to determine structure and locate faults.
Fulton	Lancaster County, Pennsyl.	Borings Trenches Test Mapping Seismic Pits	Slate	Nuclear Power Plant (HTGR)	Extensive Geologic Studies by D&M
Nine Mile Point	Lycoming NY	Six Tunnel Borings (Offshore)	Sandstone and Shale	Service Water Tunnel	
C.N. Sanfillian	Spain	Borings and Mapping	Limestone	N.P.P.	
Montezuma	Arizona	Borings and Mapping	Granite Gneiss	Dams, Tunnels, Underground P.H. (Pumped Storage)	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Bath County Pumped Storage Vepco 1971	Bath County, VA	Test Borings Test Pits Piezometers	Till Sandstone	Pumped Storage Power Generation	Undisturbed Samples Oriented Core Permeability Tests
NEP 1&2 N.E. Electric Power & Light Company 1974	Charlestown, RI	Test Borings Piezometers Well Tests	-	Nuclear Power Plant	(Drawdown) Permeability Characteristics Salt Water Intrusion
Petersburg Unit 2 Indianapolis Power & Light Company 1980	Petersburg, IN	Test Borings - 6	Alluvium Clay Till Coal	Fossil	-
North Anna Units 3&4 Vepco 1975-1982	Mineral, VA	Test Borings Test Pits Piezometers Lab Test Program	Saprolite Granite Gniess	Nuclear Power Plant	Undisturbed Sampling Deep Holes Permeability Tests Extensometers

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Bridgeport Harbor Station United Illuminating Company 1983	Bridgeport, CT	Test Borings - 3	Fill Clay	Fossil	-
Shoreham-Unit 1 LILCO 1983	Long Island, NY	Test Borings	Sand	Nuclear Power Plant	Liquefaction Analysis Densification (vibroflotation)
Hookers Point Station Tampa Electric Company 1974	Tampa, FL	Test Borings - 2	Clay/Sand Limestone	Fossil	-
Caribou Dam Maine Public Service Company 1981	Caribou, ME	Test Borings - 3 Test Probes Underwater Inspection	Alluvian Gneiss	Existing Dam/ Stability Analysis	
Squa Pan Dam Maine Public Service Company 1978	Masardis, ME	Test Borings - 5 Piezometers - 5 Laboratory Test Program	Earth Fill Glacial Till	Existing Dam/ Stability Analysis	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Millinocket Lake & Stone Dams Great Northern Paper Company 1982	Millinocket, ME	Test Borings - 4	Concrete Glacial Till Slate	Existing Dams/ Rock Anchors	Resin Anchors
Ripogenous Dam Great Northern Paper Company 1983	Millinocket, ME	Test Borings - 2 Piezometers - 2	Earth Fill	Existing Dam/ Stability Analysis	
Kinneytown Dam Arco Metals Company 1983	Seymour, CT	Test Borings - 11	Earth Fill Alluvium Gneiss	Existing Dam/ Small Hydro	
Bark Burning Boiler Great Northern Paper Company	East Millinocket, ME	Test Borings Test Pits Laboratory Test Program	Lacustrine Glacial Till	Power Plant	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
East Millinocket Dam Great Northern Paper Company 1979	East Millinocket, ME	Test Borings	Concrete Earth Fill Glacial Till	Existing Dam/ Stability Analysis	
Kennedy Station Jacksonville Electric Authority 1983	Jacksonville, FL	Test Borings - 4 Offshore Underwater Inspection	Sand Caliche	Power Plant/ Intake Structure Design	
North Anna Units 1&2 Vepco 1974-1976	Mineral, VA	Test Borings Test Wells - 2 (Pump Tests) Piezometers Inclinometers Laboratory Test Program Clay Mineralogy Settlement Instrumentation Instrument Monitoring	Earth Fill Residual Clays Saprolite Gneiss	Existing Dam/ Stability Analysis Horizontal Drains	Nuclear Category I Structure Undisturbed Sampling Terra-probe Survey of Horizontal Drains
Fairfax Falls Plant Central Vermont	Fairfax, VT	Test Borings - 2 Site Geological Reconnaissance	Phyllite Graywacke	Existing Dam/ Small Hydro Feasibility	

TABLE 2-1 (Cont)

Project Name	Project Location	Scope of Investigation	Soil/Rock Type	Structure Type	Comments
Public Service Company 1983					
Sourdnahunk Falls and "Big A" Sites Great Northern Paper Company	Millinocket, ME	Six Test Borings including 1 inclined 200+ft Test Pits - Borrow Investigation Soils Test	Glacial Till and Granite	Hydro Sites - Preliminary Investigations	

TABLE 2-2

PIEZOMETERS AND INCLINOMETERS
REPRESENTATIVE EXPERIENCE
STONE & WEBSTER ENGINEERING CORPORATION

Project	Client	State	Year	Instrumentation
Bath County Pumped Storage Project Feasibility Study	Virginia Electric and Power Company	VA	1972	24 slotted screen standpipe piezometers installed in rock.
Condit Dam	Pacific Power and Light Company	WA	1972	3 hydraulic piezometers installed in conjunction with FPC safety inspection.
Canal Site Study	Philadelphia Electric Company	PA	1972	6 slotted screen standpipe piezometers to monitor groundwater levels and 2 slotted screen standpipe piezometers in a deep confined aquifer.
Northfield Mountain Pumped Storage Project	Northeast Utilities Service Company	MA	1972	5 hydraulic piezometers installed in embankment of main dam.
Beaver Valley Nuclear Power Station	Duquesne Power and Light Company	PA	1975	7 slotted screen and 2 porous stone standpipe piezometers.
Danskammer Coal Reconversion	Central Hudson Gas and Electric Company	NY	1983	5 - 6" diameter slotted screen standpipe piezometers to monitor groundwater level and quality.
Fulton Generating Station	Philadelphia Electric Company	PA	1972	6 slotted screen standpipe piezometers in the rock foundation.
Malakoff Electric Generating Station	Houston Power and Light Company	TX	1981	6 inclinometers installed for use with seismic cross hole survey. 10 slotted screen standpipe piezometers.
Manatee, Sanford, & Martin Power Stations	Florida Power and Light Company	FL	Ongoing	SWEC wrote specifications for installation and evaluates the data from over 400 slotted screen standpipe piezometers at three cooling pond dams.

TABLE 2-2 (Cont)

Project	Client	State	Year	Instrumentation
Both groundwater level and quality are monitored.				
Mexico Bottom Site	Indianapolis Power and Light Company	IN	1977	Observation wells installed in conjunction with pump tests.
Millstone Nuclear Power Station	Northeast Utilities Service Company	CT	1973	4 inclinometers in conjunction with seismic crosshole tests.
North Anna Nuclear Power Station	Virginia Electric and Power Company	VA	1973	3 inclinometers in service water reservoir dike. 9 pneumatic diaphragm type piezometers placed in dike fill during construction. 9 pneumatic diaphragm type piezometers installed in borings in service water reservoir dike. Observation wells installed in slope adjacent to containment.
Salem Harbor Station	New England Power Company	MA	1977	4 inclinometers, 4 pneumatic diaphragm type piezometers, and 4 slotted screen standpipe piezometers installed in bulkhead.

TABLE 2-3

SEDIMENTARY GEOLOGY
REPRESENTATIVE EXPERIENCE
STONE & WEBSTER ENGINEERING CORPORATION

Project Name	Location	Type of Installation
Canaan Mtn. Pumped Storage Project and Schenob Brook Pumped Storage Project, Northeast Utilities Service Company	Canaan, CT Sheffield, MA	Proposed Pumped Storage Project with Underground Powerhouse
Rio Dam Orange & Rockland Utilities	Lumberland, NY	Surface Penstock Replacement
Raystown Hydroelectric Project, Allegheny Electric Cooperative, Inc.	Juniata River, PA	Hydroelectric Project with Tunnels and Cofferdams
Patriot Generating Station, Indianapolis Power & Light Company	Patriot, IN	Power Plant, Solid Waste Disposal, and Waste Ponds
FitzPatrick Nuclear Power Plant, Power Authority of the State of New York	Scriba, NY	Excavation for Power Plant
Northfield Mountain Pumped Storage Project Northeast Utilities Service Company	Northfield, MA	Pumped Storage Project Dams & Underground Powerhouse
Oswego Steam Station, Units 5 & 6, Niagara Mohawk Power Corporation	Oswego, NY	Shaft, Tunnels, and Surface Excavations
New Haven Nuclear Power Station, New York State Electric and Gas Corporation	New Haven, NY	Proposed Power Plant
Haven Nuclear Power Plant	Haven, WI	Proposed Nuclear Power Plant

TABLE 2-3 (Cont)

Project Name	Location	Type of Installation
Cooper Nuclear Station	Brownville, NB	Nuclear Power Station
Vermont Pumped Storage Project	Middlebury, VT	Proposed Pumped Storage Project with Underground Powerhouse

2.2 GUILD DRILLING COMPANY

Test Boring Experience

Guild Drilling Company is the largest drilling company in New England with experience throughout the area. Drillers are experienced in making standard soil borings and large diameter borings as well as obtaining undisturbed samples; coring rock, including oriented core and overcoring; performing pressure tests, and borehole permeability tests and vane shear tests; drilling inclined boreholes, and drilling offshore. They also have extensive experience installing instrumentation including piezometer, inclinometer casings, extensometers, permanent bench marks, and deep settlement points. This work was performed for design of buildings and dams, utilities, transportation and waterfront facilities, mineral exploration and groundwater monitoring.

The following listing of typical projects includes a summary of the work scope which demonstrates the broad experience of the company.

BUILDINGS

Project:	Capitol Center Project
Location:	Providence, R.I.
Owner:	State of Rhode Island
Scope:	Soil Test Borings, Core Drilling & Observation Wells Installation

Project:	John Hancock Tower
Location:	Boston, Mass.
Owner:	John Hancock Life Insurance Co.
Scope:	Soil Test Borings, Core Drilling and Undisturbed Sampling

Project:	I B M Group Headquarters Facility
Location:	Somers, N.Y.
Owner:	International Business Machines Corporation
Scope:	Soil Test Borings, Split Barrel, Core Drilling, Piezometer Installation

Project:	Mid-Connecticut Resource Recovery Facility
Location:	Hartford, Ct.
Owner:	Combustion Engineering,Inc.
Scope:	Soil Test Borings, Core Drilling, Undisturbed Sampling, Observation Wells, Cone Penetrometer Testing

Project:	Hydroelectric Station
Location:	Corinth, N.Y.
Owner:	International Paper Co.
Scope:	Soil Test Borings, Core Drilling, Pressure Testing

BUILDINGS (continued) -

Project:	New Boston Power Station
Location:	Boston, Mass.
Owner:	Boston Edison Co.
Scope:	Soil Test Borings, Core Drilling on Land & Water
Project:	City Plaza Project
Location:	Hartford, Ct.
Owner:	Urban Investment & Development Co.
Scope:	Soil Test Borings, Core Drilling, Observation Wells
Project:	Copley Place Development
Location:	Boston, Mass.
Owner	Urban Investment & Development Co.
Scope:	Soil Test Borings, Core Drilling & Undisturbed Sampling
Project:	Exchange Place
Location:	Providence, R.I.
Owner:	Gilbane Properties,Inc.
Scope:	Soil Test Borings
Project:	Hynes Auditorium Expansion
Location:	Boston, Mass.
Owner:	Massachusetts Convention Center Authority
Scope:	Soil Test Borings, Core Drilling, Pneumatic Piezometer Installation

BUILDINGS (continued) -

Project:	South Station Transportation Center
Location:	Boston, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Soil Test Borings, Core Drilling, Undisturbed Sampling

Project:	Woman's & Infant's Hospital
Location:	Providence, R.I.
Owner:	Woman's & Infant's Hospital
Scope:	Soil Test Borings

Project:	Union Station
Location:	New Haven, Conn.
Owner:	National Railroad Passenger Corporation (AMTRAK)
Scope:	Soil Test Borings & Core Drilling

Project:	Montaup Electric Coal Conversion Project
Location:	Somerset, Mass.
Owner:	Montaup Electric Co.
Scope:	Soil Test Borings & Core Drilling

Project:	Salem Harbor Coal Conversion Program
Location:	Salem, Mass.
Owner:	New England Power Service Corporation
Scope:	Soil Test Borings, Core Drilling

DAMS

Project:	Dam Site Study
Location:	Millinocket, Maine
Owner:	Great Northern Paper Co.
Scope:	Soil Test Borings, Core Drilling & Pressure Testing

Project:	North Hartland Dam Project
Location:	North Hampton, Vermont
Owner:	Vermont Electric Cooperative
Scope:	Soil Test Borings, Core Drilling, Pressure Testing

Project:	Wachusetts Reservoir Dam
Location:	Clinton, Mass.
Owner:	Metropolitan District Commission, Water Division
Scope:	Soil Test Borings, Core Drilling & Pressure Testing, Pneumatic Piezometer Installation

Project:	McKenzie Dam Stability Analysis
Location:	Wallingford, Ct.
Owner:	Town of Wallingford
Scope:	Soil Test Borings, Core Drilling, Piezometer & Observation Well Installation, Permeability Testing

Project:	Lynde Brook & Kettle Brook Dams
Location:	Leicester-Paxton, Mass.
Owner:	City of Worcester, Mass.
Scope:	Soil Test Borings, Core Drilling, Piezometer INstallation, Permeability Testing

DAMS (continued) -

Project:	Knightsville Dam
Location:	Westfield, Mass.
Owner:	U.S. Engineers, New England Division
Scope:	Soil Test Borings, Slope Inclinometer Casing Installation, Pitcher Sampling
Project:	Sherman Dam
Location:	Rowe, Massachusetts
Owner:	New England Power Service Corporation
Scope:	Soil Test Borings, Piezometer Installation, Permeability Testing
Project:	Harriman Dam
Location:	Whittingham, Vermont
Owner:	Yankee Atomic Electric Co.
Scope:	Soil Test Borings, Undisturbed Sampling of Granular Soils, Permeability Testing, Pneumatic Piezometer Installation

GEOTECHNICAL INSTRUMENTATION

Project:	MBTA Southwest Corridor, Sect. I
Location:	Boston, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Inclinometers, Inclinometer/Sondex, Pneumatic Piezometers, Observation Wells, Permanent Benchmarks

Project:	MBTA Southwest Corridor, Sect. 2
Location:	Boston,Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Sondex Casings, Pneumatic Piezometers, Permanent Benchmarks, Observation Wells

Project:	Reconstruction I-84
Location:	East Hartford, Ct.
Owner:	State of Connecticut
Scope:	Inclinometers, Pneumatic Piezometers

Project:	MBTA Southwest Corridor Forest Hills Station
Location:	Boston, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Pneumatic Piezometers, Borros Anchors, Tilt Plates, Observation Wells

Project:	Route 9 By-Pass
Location:	Keene, New Hampshire
Owner:	State of New Hampshire
Scope:	Inclinometers & Permanent Benchmarks

GEOTECHNICAL INSTRUMENTATION (continued) -

Project:	MBTA Redline Extension NW
Location:	Cambridge, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Inclinometers, Multiple Position Borehole Extensometers, Piezometers, Deep Settlement Points

Project:	Capitol Center Project
Location:	Providence, R.I.
Owner:	State of Rhode Island
Scope:	Inclinometers

Project:	Slope Stability Study
Location:	Springfield, Vermont
Owner:	Town of Springfield
Scope:	Inclinometers

Project:	MBTA Harvard Square Station
Location:	Cambridge, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Inclinometers, Multiple Position Borehole Extensometers (in Soil), Piezometers, Permanent Benchmarks

Project:	MBTA Porter Square Station
Location:	Cambridge, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Inclinometers, Multiple Position Borehole Extensometers, (Vertical & Angle) Piezometers, Overcoring

GEOTECHNICAL INSTRUMENTATION (continued) -

Project:	MBTA Alewife Station & Garage
Location:	Cambridge, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Inclinometers, Pneumatic Piezometers

GROUND WATER MONITORING

Project: Bald Mountain Mine Site

Location: Portage, Maine

Owner: Superior Mining Co.

Scope: Soil Test Borings, Core Drilling, Piezometer Installation, Observation Well Installation, Dennison Sampling, Permeability Testing

Project: Sanitary Landfill Studies

Location:

Londonderry, N.H.	Quincy,Mass.
Cumberland, R.I.	Burrilville, R.I.
Lunenberg, Mass.	Methuen, Mass.
Rochester, N.H.	Gloucester,R.I.
Andover, Mass.	Holliston,Mass.
Tiverton, R.I.	Manchester,N.H.
Attleboro, Mass.	Johnston, R.I.
No. Smithfield, R.I.	Cranston, R.I.

Owner: Various Municipalities

Scope: Soil Test Borings, Core Drilling & Monitor Well Installation, Permeability Testing & Gas Drive Sampler Installation

Project: Service Stations & Industrial Facilities

Location: Over 50 locations in New England including

Wallingford, Ct.	Bourne, Mass.
Danbury, N.H.	Bristol, Ct.
Norwich, Ct.	Davisville, R.I.
Farmington, N.H.	Killingly, Ct.
Richmond, R.I.	Cranston,R.I.

Owner: Private Industry

Scope: Monitoring Well Installation

Project: Massachusetts "21 E" Studies

Location: Over 150 locations in Massachusetts

Owner: Prospective Buyers

Scope: Soil Test Borings and Monitor Well Installations

HAZARDOUS WASTE SITES

Project:	Gilson Road Hazardous Waste Site
Location:	Nashua, N.H.
Owner:	U.S.Environmental Protection Agency
Scope:	Soil Test Borings, Core Drilling, Piezometer, Observation Westt and Gas Drive Sampler Installations
Project:	Piccillo Hazardous Waste Site
Location:	Coventry, R.I.
Owner:	Rhode Island Department of Environmental Management
Scope:	Soil Test Borings, Core Drilling, Observation Wells
Project:	Re-Solve Hazardous Waste Site
Location:	No. Dartmouth, Mass.
Owner:	U.S.Environmental Protection Agency
Scope:	Soil Test Borings, Core Drilling, Monitoring Well Installation
Project:	Davis Hazardous Waste Site
Location:	Smithfield, R.I.
Owner:	State of Rhode Island Department of Environmental Management
Scope:	Soil Test Borings, Core Drilling, Observation Wells
Project:	Western Sand & Gravel Hazardous Waste Site
Location	North Smithfield, R.I.
Owner:	State of Rhode Island Department of Environmental Management
Scope:	Soil Test Borings, Core Drilling & Pressure Testing, Observation Wells and Gas Drive Sampler Installations

MINERAL EXPLORATION

Project:	Industrial Minerals
Location:	Central Vermont
Owner:	Cyprus Industrial Minerals
Scope:	Diamond Core Drilling (Vertical & Angle), Multishot Borehole Surveys, Borehole Grouting

Project:	Maple-Hovey Project
Location:	Northern Maine
Owner:	Phelps-Dodge, Inc.
Scope:	Diamond Core Drilling (Vertical & Angle)

Project:	Quarry Development Program
Location:	Central Vermont
Owner:	OMYA, Inc.
Scope:	Diamond Core Drilling (Vertical & Angle)

Project:	Spangle r Farm Exploration
Location:	Lancaster County, Pa.
Owner:	CyprusIndustrial Minerals
Scope:	Diamond Core Drilling (Vertical & Angle)

Project:	Mine Site Expansion
Location:	Northern Vermont
Owner:	Englehardt Corp.
Scope:	Diamond Core Drilling (Vertical & Angle)

Project:	Granite Exploration
Location:	Southern Maine
Owner:	Blue Rock Industries
Scope:	Diamond Core Drilling (Vertical & Angle)

Project: Big River Reservoir Project

Location: Coventry - West Greenwich, R.I.

Owner: State of Rhode Island

Scope: Soil Test Borings, Core Drilling, Permeability & Rock Pressure Testing

Project: New Boston Main Interceptor

Location: Boston, Mass.

Owner: City of Boston

Scope: Soil Test Borings, Undisturbed Sampling

Project: City Wide Sewer System

Location: Norwich, Conn.

Owner: City of Norwich

Scope: Soil Test Borings, Core Drilling & Observation Well Installation

Project: Sewer Tunnels

Location: Rochester, New York

Owner: Rochester Pure Waters District

Scope: Soil Test Borings, Core Drilling & Pressure Testing, Piezometer Installation

Project: Sewerage System

Location: Scarborough, Maine

Owner: Town of Scarborough

Scope: Soil Test Borings, Core Drilling

Project: Genesee Gorge Bridge

Location: Rochester, N.Y.

Owner: Rochester Pure Water District

Scope: Soil Test Borings & Core Drilling

Project:	Portsmouth Abbey Reapirs
Location:	Portsmouth, R.I.
Owner:	The Order of St.Benedict
Scope:	Cement Grouting & Mud Jacking of Floor Slabs

Project:	Subsidence Control
Location:	Cumberland, R.I.
Owner:	Rhode Island Department of Environmental Management
Scope:	Sand-Cement Grouting of Abandoned Coal Mine

Project:	Fish Ladder Repairs
Location:	Bellows Falls, Vermont
Owner:	New England Power Servdce Corporation
Scope:	Chemical Grout Injection for Seepage Control

Project:	Slab Leveling
Location:	East Providence, R.I.
Owner:	PPG Industries
Scope:	Mud Jacking Floor Slabs

Project:	Column Foundation Settlement
Location:	Newport, R.I.
Owner:	City of Newport
Scope:	Cement Grouting beneath Column Footings

Project:	Abutment Grouting at Thatcher St. Bridge
Location:	Attleboro,Mass.
Owner:	Commonwealth of Massachusetts Dept. of Public Works
Scope:	Cement Grouting of Voids in and behind Abutment

Project:	Boston College Sports Complex
Location:	Newton, Mass.
Owner:	Boston College
Scope:	Cement Grout Voids Beneath Floor Slabs

TRANSPORTATION

Project:	Jamestown Bridge Replacement
Location:	North Kingstown - Jamestown, R.I.
Owner:	State of Rhode Island
Scope:	Soil Test Borings, Core Drilling & Undisturbed Sampling on Land and Water

Project:	Interstate Route I-93
Location:	Franconia Notch, N.H.
Owner:	State of New Hampshire
Scope:	Soil Test Borings, Core Drilling

Project:	Interstate Route I-91
Location:	Windsor, Connecticut
Owner:	State of Connecticut
Scope:	Soil Test Borings, Core Drilling

Project:	Bridge over Mystic River
Location:	Somerville, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Soil Test Borings and Core Drilling

Project:	Third Harbor Tunnel Study
Location:	Boston,Mass.
Owner:	Commonwealth of Massachusetts
Scope:	Soil Test Borints, Core Drilling, Environmental Sampling on Land & Water

TRANSPORTATION (continued) -

Project:	Vent Shafts - MBTA Green Line
Location:	Boston,Mass.
Owner:	MassachusettsBay Transportation Authority
Scope:	Soil Test Borings, Core Drilling, Undisturbed Sampling

Project:	Noank Cove R.R.Bridge
Location:	Noank, Conn.
Owner:	National Railroad Passenger Corporation (AMTRAK)
Scope:	Soil Test Borings, Core Drilling

Project:	Central N.H. Turnpike
Location:	Nashua, N.H.
Owner:	State of New Hampshire
Scope:	Soil Test Borings, Core Drilling

Project:	Central Artery Section1, Areas A & B
Location:	Charlestown-Cambridge,Mass.
Owner:	Commonwealth of Massachusetts
Scope:	Soil Test Borings, Core Drilling & Undisturbed Sampling

Project:	Reconstruction Route I-91
Location:	Hartford-Windsor, Conn.
Owner:	State of Connecticut
Scope:	Soil Test Borings & Core Drilling

Project:	MBTA Red Line Extension NW
Location:	Cambridge-Somerville,Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Soil Test Borings, Core Drilling & Pressure Testing, Piezometer and Observation Well Installation

Project:	Shaws Cove Railroad Bridge Relocation
Location:	New London,Conn.
Owner:	National Railroad Passenger Corporation (AMTRAK)
Scope:	Soil Test Borings & Core Drilling on Land and Water

Project:	Merrimack River Bridge
Location:	Lowell, Mass.
Owner:	Commonwealth of Massachusetts Department of Public Works
Scope:	Soil Test Borings and Core Drilling on Land and Water

Project:	Rouse Point Bridge
Location:	Rouse Point, N.Y.
Owner:	Commonwealth of Massachusetts Department of Public Works
Scope:	Soil Test Borings on Land and Water, Vane Shear Testing, Undisturbed Sampling

Project:	Porter Square MBTA Station
Location:	Cambridge, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Soil Test Borings, Core Drilling (Vertical & Angle), Oriented Coring, Observatinn Wells, Piezometers

TRANSPORTATION (continued) -

Project:	Interstate Route 93, Moore Reservoir Crossing
Location:	Littleton, N.H.
Owner:	State of New Hampshire Department of Public Works
Scope:	Soil Test Borings and Core Drilling on Water

Project:	I-93, Route 16 Reconstruction
Location:	Medford, Mass.
Owner:	Commonwealth of Massachusetts Department of Public Works
Scope:	Soil Test Boring, Core Drilling, Undisturbed Sampling, Vane Shear Testing

Project:	Hampton Harbor Bridge
Location:	Seabrook,N.H.
Owner:	State of New Hampshire
Scope:	Soil Test Borings and Core Drilling on Water

Project:	MBTA Southwest Corridor Extension, Sect. II & III
Location:	Boston, Mass.
Owner:	Massachusetts Bay Transportation Authority
Scope:	Soil Test Borings, Core Drilling, Undisturbed Samples, Menard Pressure Water Testing, Observation Wells

WATERFRONT FACILITIES

Project:	Floating Drydock Moorings
Location:	Portland, Maine
Owner:	Bath Iron Works
Scope:	Soil Test Borings and Core Drilling on Water
Project:	IBM Fuel Unloading Facility
Location:	Poughkeepsie, N.Y.
Owner:	International Business Machines Corporation
Scope:	Soil Test Borings and Core Drilling
Project:	Steamship Pier Extension
Location:	New Bedford, Mass.
Owner:	Steamship Authority
Scope:	Soil Test Borings and Core Drilling on Water
Project:	Seabrook Station Circulating Water System
Location:	Seabrook, N.H.
Owner:	Public Service Co. of New Hampshire
Scope:	Oriented Coring, Soil Test Borings, Core Drilling, Pressure Testing, Undisturbed Sampling

2.3 GEOD SURVEYING AND AERIAL MAPPING CORPORATION

General Statement of Qualifications

GEOD offers a full range of surveying and mapping services. The following Statement of Qualifications, listing of offered services, and summaries of past projects, provide a more detailed description of GEOD's capabilities.

STATEMENT OF QUALIFICATIONS

IN 1961, GEOD SURVEYING AND AERIAL MAPPING (Emilius & Associates) BEGAN PRACTICE AS A CONSULTANT TO ENGINEERS IN THE PRIVATE SECTOR, UTILITY COMPANIES, AND TO FEDERAL, STATE AND MUNICIPAL AGENCIES

GEOD IS COMPRISED OF A STAFF OF HIGHLY QUALIFIED PROFESSIONALS AND TECHNICIANS USING PRECISION SURVEY, PHOTOGRAMMETRIC AND HYDROGRAPHIC INSTRUMENTATION WHICH HAS ENABLED THE COMPANY TO PROVIDE FIRST ORDER MEASUREMENTS ON COMPLEX PROJECTS AND TO BE RECOGNIZED AS ONE OF THE LEADERS IN THE PROFESSION.

IN THE SIXTIES, GEOD'S PROJECTS RANGED FROM THE PARAMUS, NEW JERSEY SEWER SYSTEM TO ENGINEERING SURVEYS ON INTERSTATE ROUTE 80. THE ROUTE 23 EXTENSION AND EXPANSION HIGHWAY PROGRAMS, ALONG WITH UTILITY AND PIPELINE PROJECTS ARE A GENERAL CROSS-SECTION OF SERVICES PROVIDED.

THE SEVENTIES WERE MORE EXPANSIVE IN THE LINES OF PHOTOGRAMMETRIC MAPPING AND CONTROL SURVEYS FOR THE PROPOSED I-287 EXTENSION THROUGH NORTHERN NEW JERSEY AND THE ROUTE 4 WIDENING AND IMPROVEMENT PROGRAM FROM THE GEORGE WASHINGTON BRIDGE TO ROUTE 208 IN NEW JERSEY.

PROPERTY SURVEYS FOR THE EXPANSION OF THE THIRD LARGEST SEWERAGE DISPOSAL SYSTEM IN THE COUNTRY BEGAN IN THE CITY OF NEWARK, NEW JERSEY FOR PASSAIC VALLEY SEWERAGE COMMISSIONERS. THIS LED TO AN ENGINEERING CONTROL SURVEY PROGRAM THAT WAS DEVELOPED FOR OVERALL COORDINATION WITH THE CONSTRUCTION COMPANIES.

THE LATTER PART OF THE SEVENTIES BROUGHT GEOD INTO THE FIELD OF HYDROGRAPHIC SURVEYING AND MAPPING WITH PROJECTS FROM THE CARIBBEAN TO MAINE, INCLUDING SEVERAL PROJECTS WITHIN THE NEW YORK METROPOLITAN AREA.

THE ABILITY TO COMBINE THE VARIOUS SECTIONS OF SURVEYING THROUGH THE USE OF AERIAL PHOTOGRAMMETRIC MAPPING IN CONJUNCTION WITH GROUND CONTROL AND HYDROGRAPHIC SURVEYS BROUGHT RECOGNITION TO GEOD SURVEYING AND AERIAL MAPPING THROUGH A FEATURE ARTICLE IN "ENGINEERING NEWS RECORD", APRIL, 1980.

GEOD HAS COMMITTED ITSELF IN THE EIGHTIES TO INCREASING ITS STAFF OF HIGHLY TRAINED PERSONNEL, EXPANDING ITS INVENTORY OF TECHNICAL INSTRUMENTATION, AND TO CONTINUING TO PROVIDE THE BEST FIELD INFORMATION TO ITS CLIENTS THROUGH ITS PHOTOGRAMMETRIC, HYDROGRAPHIC, OCEANOGRAPHIC SURVEY DIVISIONS AND ITS LAND AND ENGINEERING SURVEY DIVISION, IN A PROFESSIONAL, TIMELY AND COST-EFFECTIVE MANNER.

GEOD'S SURVEYORS ARE LICENSED IN FIFTEEN STATES ALONG THE EASTERN SEABOARD REGION, AND ITS PRESIDENT, PAUL J. EMILIUS, IS RECOGNIZED AS "CERTIFIED PHOTOGRAMMETRIST" BY THE AMERICAN SOCIETY OF PHOTOGRAMMETRY.

GEOD HAS A SUFFICIENT NUMBER OF EXPERIENCED SURVEY AND TECHNICAL PERSONNEL WHO HAVE WORKED ON A WIDE VARIETY OF SURVEY PROJECTS AND ARE AVAILABLE FOR IMMEDIATE ASSIGNMENT.

GEOD OWNS THE LATEST, MOST PRECISE SURVEY AND PHOTOGRAMMETRIC INSTRUMENTATION AVAILABLE, AND HAS THE RESOURCES, BOTH PROFESSIONAL AND FINANCIAL TO ASSURE THE TIMELY AND ECONOMICAL COMPLETION OF ALL PROJECTS.

WE CAN PROVIDE THE FOLLOWING FIELD INFORMATION SURVEYS:

AERIAL MAPPING SURVEYS (PHOTOGRAMMETRIC METHODS)

TOPOGRAPHIC MAPPING
ROUTE SELECTION SURVEYS
VOLUMETRIC MEASUREMENTS & COMPUTATIONS
EARTHWORK & STOCKPILE MEASUREMENTS
FLOOD PLAIN MAPPING - CITY MAPPING
DIGITAL DATA RECORDING AND PLOTTING
PROFILES - CROSS SECTIONS
AERIAL PHOTOGRAPHY IN B&W AND COLOR

CLOSE RANGE, TERRESTRIAL SURVEYS (PHOTOGRAMMETRIC METHODS)

TUNNELS - BUILDINGS - DAMS (Cross sections/movement)
ARCHAEOLOGICAL SITES
RESTORATION SURVEYS

CADASTRAL, CONTROL, ENGINEERING SURVEYS

BRIDGE SURVEYS (Liveload/deadload geometry)
VERTICALITY SURVEYS
ASSURANCE SURVEYS (record surveys/as-built)
PROPERTY ACQUISITION SURVEYS
HORIZONTAL AND VERTICAL CONTROL SURVEYS

HYDROGRAPHIC SURVEYS

PORTS AND HARBORS
CHANNEL SECTIONS
DREDGING (volumes)
SWEEP SURVEYS
SIDE SCAN
SILTATION
COASTAL WATERWAYS
BATHYMETRY
ON-SHORE, NEAR-SHORE, OFF-SHORE ELECTRONIC POSITIONING

THROUGH OUR ASSOCIATION WITH VARIOUS QUALIFIED SUBCONTRACTORS WE CAN PROVIDE:

The following: ORTHOPHOTOGRAPHIC CAPABILITIES
ANALYTICAL AEROTRIANGULATION
PHOTOGRAPHIC ENLARGEMENTS AND REDUCTIONS

PROJECT HISTORY

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT
CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203

Mr. Ed Palguta
(301) 962-4068

AERIAL PHOTOGRAMMETRIC MAPPING FOR LOCK HAVEN/LOCKPORT AND VICINITY, CLINTON COUNTY, PENNSYLVANIA

New aerial photography in color was provided at scales of 1" = 400' and 1" = 800'. Photo control surveys were conducted for proper spatial orientation of the photography. Topographic mapping was compiled and drafted at a scale of 1" = 50' with 1' contour intervals, including a field edit and utility information portrayed on the maps. A topographic map at a scale of 1" = 100' with 2' contours was compiled in pencil manuscript format for another portion of the project outlined. Hydrographic surveys of underwater portions of the Susquehanna River were performed. Elevations at 50' intervals to 250' offshore were obtained sufficient to develop 1' contours throughout the area. Contours of stream bottoms were plotted directly on the topographic maps. Other tasks performed in connection with the overall scope of this contract included providing photo mosaics, analytical aero-triangulation and monumentation.

MARYLAND DEPARTMENT OF NATURAL RESOURCES
DEWBERRY & DAVIS ENGINEERS
2594 RIVA ROAD
ANNAPOLIS, MARYLAND 21401

Mr. Daniel Tsamouras
(703) 560-1100

AERIAL PHOTOGRAPHY AND TOPOGRAPHIC MAPPING OF THE SHORELINES AND OTHER PORTIONS OF TALBOT, WICOMICO AND QUEEN ANNES COUNTIES, MARYLAND

Aerial photography was obtained in black and white providing full stereoscopic coverage of the project area. Horizontal and vertical field control surveys were conducted for proper spatial orientation of the photography. Photogrammetric mapping was compiled at a scale of 1" = 600' with 2' contours and provided on reproducible mylar sheets. A total of approximately 900 miles of shoreline were mapped in this project.

CITY OF NEWARK
DEPARTMENT OF ENGINEERINGS
920 BROAD STREET
NEWARK, NEW JERSEY 07102

Mr. Raymond Maciag, Surveyor
(201) 733-8808

PHOTOGRAMMETRIC MAPPING OF THE ENTIRE CITY OF NEWARK, NEW JERSEY

We provided new aerial photography, field control surveys, analytical aero-triangulation to supplement the field control, stereo-photogrammetric manuscript compilation at a scale of 1" = 100' with 2' contour intervals and preparation of photo mosaic of the entire project area. A follow-up project for the preparation of new city ward maps and new city road maps was accomplished by us utilizing the existing topographic maps above. We prepared planimetric maps at a scale of 1" = 500' for each city ward. These maps contained all roads, railroads and streams within the corporate city limits. Road maps were prepared at 1" = 1,000' showing all roads, railroads and major roadways throughout the city, including the Newark International Airport area.

PROJECT HISTORY

CITY OF NEW YORK
DEPARTMENT OF TRANSPORTATION
Mr. Walter Zimmerman

SVERDRUP & PARCEL (Sverdrup Corporation)
1250 Broadway, New York, New York 10001
Mr. Donald Weisstuch, Mr. Irving Perlman
(212)695-4959

AERIAL PHOTOGRAPHY AND PLANIMETRIC MAPPING FOR PRELIMINARY DESIGN OF STREET IMPROVEMENTS, NEW YORK CAPITAL PROJECT HW-411, OZONE PARK, QUEENS

We provided aerial photography, primary ground control surveys, baseline surveys, planimetric manuscripts at 1" = 30' for 37,000 linear feet of roadway, cross sections at 50' intervals were taken, bench marks were set at 300' intervals and all first floor elevations were obtained. Plotting of all tax maps was accomplished showing lot and block information, field edit for utilities, verification and classification of each, elevations were obtained on all street hardware.

MASON & HANGER -
Silas Mason & Company, Inc.
437 Madison Avenue
New York City, New York 10022

Mr. Eugene Casey
Mr. Vincent Mangieri
(212)371-3820

CAPITAL PROJECT HW-379
AERIAL PHOTOGRAPHY & PLANIMETRIC MAPPING FOR RECONSRUCTION OF 14th STREET

Aerial photography, primary ground control surveys, baseline surveys, planimetric manuscripts at a scale of 1" = 30' for 12,000 linear feet of raodway were provided. Cross sections at 50' intervals were taken, bench marks were set at 300' intervals and all first floor elevations were obtained.

STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
Mr. Theodore Fischer
(609)292-8424

TRAVERS ASSOCIATES (Joint-Venture)
A.G. Lichtenstein & Associates
Calvin Gibson Associates

Lawrence Hahne
A.G.Lichtenstein
Ed Lawrence

ROUTE 4 CORRIDOR STUDY - AERIAL PHOTOGRAPHY, PRIMARY GROUND CONTROL SURVEYS FOR 9 MILES OF ROUTE 4 IN BERGEN COUNTY, NEW JERSEY FROM THE GEORGE WASHINGTON BRIDGE TO ROUTE 208

We provided aerial photography, primary ground control surveys, second order traverse and second order levels, planimetric and topographic base maps at scales of 1" = 30' with 1' contour intervals and 1" = 100' with 2' contour intervals. A field edit was performed for all surface evidence of utilities, and verification and classification of all planimetric features. Approximately 95 bench marks and 50 monuments were set along the route.

CLINTON BOGERT ASSOCIATES
2125 Center Avenue, Fort Lee, N.J. 07024

Mr. Edward Stevens
201-944-1676

RATZER ROAD, WAYNE TOWNSHIP, PASSAIC COUNTY, NEW JERSEY. BASELINE, TOPOGRAPHY, ACQUISITION MAPPING FOR RECONSTRUCTION. Surveys were performed on the ground for the reconstruction of 2 miles of heavily traveled suburban artery. All information was compiled on 1"=20' work sheets. Over 50 "taking maps" were prepared.

PROJECT HISTORY

MORRIS COUNTY ENGINEERS OFFICE
COURTHOUSE, MORRISTOWN, N.J. 07960

Mr. George Burke
(201)285-6263

BERKSHIRE VALLEY ROAD, JEFFERSON TOWNSHIP, MORRIS COUNTY, NEW JERSEY

Baseline, topography, R-O-W mapping for reconstruction. Surveys were performed utilizing a combination of aerial and ground survey methods for two sections of highway totaling $6\frac{1}{2}$ miles. Plan and profile sheets were prepared at a scale of 1" = 20'

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
GREEN ACRES PROGRAM

SIX MILE RUN PROJECT, SOMERSET COUNTY, N.J. - 97 PARCELS, ± 430 Acres

Scope of services on this project involved surveying and computing maps covering approximately 430 acres to determine the existing boundary lines. We calculated the taking and remaining areas; marked the taking lines in the field; prepared legal descriptions on properties to be acquired; calculated and added to existing maps those parcels to be additionally acquired on lands already mapped.

PEQUEST FISH & WILDLIFE PRESERVE, WARREN COUNTY, NEW JERSEY - 28 PARCELS, ± 1,300 Acres

ALLAIRE/MANASQUAN PROJECTS, OCEAN/MONMOUTH COUNTIES, NEW JERSEY - 100 PARCELS, ± 800 Acres

Utilizing title searches existing, the descriptions of all individual parcels were checked for accuracy and sufficiency, and plotted in a composite form to determine contiguity. Existing property corners and lines of possession were located. All data was coordinated, analyzed and computations were made to determine metes and bounds, together with the acreage of each parcel involved. Partial taking lines were established, and remaining areas calculated. Preparation of individual survey maps was accomplished and legal descriptions were prepared for each taking. All individual property owners were notified through the U.S. Postal Service.

BASS RIVER STATE FOREST EXTENSION, BURLINGTON COUNTY, NEW JERSEY - ± 3,700 Acres

CEDAR CREEK HEADWATERS & MAINSTREAM PROJECTS, BERKELEY & LACEY TOWNSHIPS, OCEAN COUNTY, N.J.
± 11,075 Acres

GENERAL PUBLIC UTILITIES
STONE & WEBSTER ENGINEERING CORPORATION

FORKED RIVER NUCLEAR POWER PLANT, New Jersey

Primary first-order control—both horizontal and vertical. Coordinate values established in New Jersey State Plane Coordinate System from first-order National Ocean Survey Control. Checking and evaluation of previous surveys made by others. All survey results developed and published. Construction surveys for roads, water retention, soil removal, etc.

PUBLIC SERVICE ELECTRIC & GAS CORPORATION, NEW JERSEY

1. Location and mapping of gas line location through residential subdivision, required surveying underground pipeline for 7 miles from Allendale to Mahwah. Also, R-O-W acquisition surveys.
2. Property surveys for acquisition of Railroad R-O-W for construction of underground oil line.
3. Construction layout and "as-built" location surveys.

PROJECT HISTORY

PASSAIC VALLEY SEWERAGE COMMISSIONERS
WILSON AVENUE, NEWARK, NEW JERSEY

PASSAIC VALLEY SEWERAGE TREATMENT PLANT, NEWARK, NEW JERSEY

Surveys of boundaries, volumetric measurements to determine the amount of rock removed from excavations, provided acquisition maps for area adjacent to the sewerage plant, and are currently performing "as-built" surveys at the project site.

In the fall of 1977, P.V.S.C. started construction on the largest sewerage disposal plant on the eastern seaboard. Costs of construction are estimated to run in excess of 800 million dollars. Since 1970, we have been preparing land acquisition and engineering surveys in preparation for this monumental project. Realizing that approximately 12 large contracting companies, working on separate contracts, yet all having to be interconnected, would have to be directed by a tight horizontal control and vertical control network. Each of the 20 contracts would have to tie into the overall picture. We are proud to have been selected back in 1970 to begin work on this project and to this day, our construction surveys, baseline reviews, hydrographic and as-built surveys are still being called upon.

ORANGE & ROCKLAND UTILITIES
ONE BLUE HILL PLAZA
PEARL RIVER, NEW YORK 10965

1. 500KV Line - Keystone Project, New York Section
   Sloatsburg, New York to Bowline Point at Hudson River, New York.
2. Property acquisition for varied new and existing above ground and underground transmission lines.
3. Control surveys for construction.
4. "As-built" surveys.
5. Topographic mapping for environmental studies and presentations to various state and local boards.
6. Our survey crews performed surveys and stakeouts for various overhead transmission lines, particularly between Ringwood, New Jersey and Suffern, New York.
7. Property acquisition and right-of-way acquisition surveys for various overhead transmission lines, particularly 13 miles between Tuxedo and Sugarloaf, New York
8. Stakeout and right-of-way acquisition surveys, particularly 13 miles from Sugarloaf to Middletown, New york.

PENNSYLVANIA POWER & LIGHT COMPANY

Aerial mapping using aerial color transparencies of approximately one thousand square miles; photography for site selections; orthophotography of existing and proposed transmission lines.

NEW JERSEY BELL TELEPHONE COMPANY

Property acquisition surveys, Mays Landing, New Jersey
Proposed microwave tower site, Monroe, New Jersey
Location of (3) existing switching stations throughout northern and southern, New Jersey

PROJECT HISTORY

AMERICAN TELEPHONE & TELEGRAPH CORP., LONG LINES DIVISION
Boston to Miami Cable (New York/New Jersey Section)
Property Acquisition surveys throughout New Jersey and New York
Route selection surveys
Expert Witness - Legal Proceedings

NEW YORK STATE ELECTRIC & GAS CORPORATION
Aerial photography and topographic mapping for route selection surveys
Property surveys for condemnation proceedings
Centerline pole layout for environmental studies and construction of 69KV & 115KV transmission lines
Aerial and land studies for environmental reports
Line sag surveys and reports
Hydrographic studies

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
Underground location surveys for planning and design of proposed new gas line
Cross section for rock excavation
Aerial mapping for route selection surveys
Hydrographic surveys
Coal pile inventory - volumetric measurements
Surveys and stakeout for underground transmission lines through the streets of Ossining, New York

NEW JERSEY TRANSIT
Aerial photography and topographic mapping of 801 acres at Hoboken Rail Yard; 1"=100' with 2' contour intervals including all physical facilities identified.

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT CORPS OF ENGINEERS
26 Federal Plaza, New York, New York

GREAT SOUTH BAY, LONG ISLAND, NEW YORK

Channel information:	17.5 Miles 200' wide channel, project depth 11' below MLW
Equipment used:	22' MAKO open boat with 200 h.p. outboard motor, Raytheon Model 719B Fathometer, Motorola Mini-Ranger III Positioning Systems with three (3) Tri-sponders.

METHODOLOGY: After selection and necessary densification of shore stations, channel and control coordinates are entered in computer. Ranges were run at 200-foot intervals. A computer print-out was prepared giving the distance off two shore stations for the beginning point of each range with the magnetic bearing of the range. After the ranges were run, the field actual "fix" positions were re-entered in the computer and a plot of the "fix" positions and channel lines was automatically plotted.

HARLEM RIVER, NEW YORK

Channel information:	7.9 Miles of channel from East River to Hudson River. Project depth 20' below MLW
Equipment used:	22' MAKO open boat with 200 h.p. outboard motor, Raytheon Model 719B Fathometer, Motorola Mini-Ranger III Positioning System with three (3) Tri-sponders.

METHODOLOGY: Baseline was laid out on bulkhead. Ranges were run at 100' intervals on lines given from baseline. "Fixes" were taken with Mini-Ranger System. Tide was read simultaneously with the running of the ranges. Fathometer readings were adjusted for the tide and final maps were prepared at a scale of 1" = 50'

PROJECT HISTORY

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT CORPS OF ENGINEERS
26 Federal Plaza, New York, New York

GRAVESEND BAY ANCHORAGE, NEW YORK

Project Data: Anchorage area at entrance to New York Harbor adjacent to the Ambrose Channel, Project Depth: 45' below MLW

Equipment Used: 22' MAKO open boat with 200 h.p. outboard motor, Raytheon Model 719B Fathometer, Motorola Mini-Ranger III Positioning System with Three (3) Tri-sponders, K & E Paragon (20") Transit

METHODOLOGY: Ranges were over 3/4 mile in length. Line was given from shore radially from a strategically placed shore station. Ranges were begun at a specific pre-computed distance from the station measured with one channel of the Mini-Ranger Syatem. Simultaneous "fixes" were taken from the transit station and another control point some 5 miles away more or less perpendicular to the range lines. Tide was read simultaneously with the running of the ranges. Fathometer records were adjusted for the tide and the final maps were prepared at a scale of 1" = 200'

AMERADA HESS CORPORATION
1 Hess Plaza, Woodbridge, New Jersey

FATHOMETER SWEEP - HESS TERMINAL, ST. CROIX, U.S. VIRGIN ISLANDS

Requirments: Check for siltation and debris after Hurricane David, September, 1979

Equipment used: 20' open boat with 50 h.p. outboard motor, Raytheon 719B Fathometer with Custom 6 Transducer Sweep Set-Up, Tellurometer Model 1000D.

METHODOLOGY: Sweep ranges were run or pre-determined lines.
Fixes were made by distance measurements with Tellurometer 1000D.

HESS BRONX TERMINAL, WESTCHESTER CREEK, BRONX NEW YORK
HESS BAYONNE TERMINAL, KILL VAN KULL, BAYONNE, NEW JERSEY
ST. LUCIA TERMINAL, DUTCH WEST INDIES
HESS TERMINAL, CHELSEA RIVER, BOSTON, MASSACHUSETTS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
Trapelo Road, Waltham, Massachsuetts

HYDROGRAPHIC CONDITION SURVEYS

FALL RIVER HARBOR, MASSACHUSETTS
SCARBORO RIVER CHANNEL, SCARBORO, MAINE
MYSTIC & CHELSEA RIVERS, BOSTON HARBOR, BOSTON, MASSACHUSETTS
NEW HAVEN HARBOR, NEW HAVEN, CONNECTICUT

WOODWARD CLYDE CONSULTANTS
Wayne, New Jersey

ROUND VALLEY & SPRUCE RUN RESERVOIRS, HUNTERDON COUNTY, NEW JERSEY

PROJECT HISTORY

FLOOD PLAIN MAPPING (FEDERAL FLOOD INSURANCE STUDIES)

TOPOGRAPHIC MAPPING FOR SELECTED STREAMS AND TRIBUTARIES WITHIN THE FOLLOWING PROJECT AREAS WAS ACCOMPLISHED AT SPECIFIC SCALES TO PROVIDE CONSULTING ENGINEERING FIRMS WITH THE DATA NECESSARY TO DELINEATE 100-YEAR AND 500-YEAR FLOOD LIMIT ELEVATIONS AND TO DETERMINE FLOOD HAZARD AREAS. ALL WORK WAS PERFORMED IN ACCORDANCE WITH THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT AND THE FEDERAL EMERGENCY MANAGEMENT AGENCY, WASHINGTON, D.C.

NEW YORK

NASSAU & SUFFOLK COUNTIES:

Manor Haven	Centre Island	Woodsburg	Valley Stream	Northpoint	Russell Gardens
Sands Point	Lawrence	Hewlett Neck	Rockville Center	Patchogue	
Bayville	Cedarhurst	Hewlett Bay Park	Massapequa Park	Village of the Branch	

Scope of work included black and white aerial photography, ground control surveys, mapping, digitized cross sections and elevation reference marks for approximately 50 miles of stream and coastline.

ORANGE & ULSTER COUNTIES:

Shawangunk	Gardiner	Crawford

Scope of work included black and white aerial photography, ground control surveys, mapping, digitized cross sections and elevations reference marks for approximately 40 miles of stream and coastline.

DUTCHESS COUNTY:

Wappinger Falls	Wappinger	Poughkeepsie	LaGrange	Pleasant Valley

These locations were part of the following Westchester area project and the work performed by our firm was identical to that outline in the following:

WESTCHESTER COUNTY:

Elmsford	Pleasantville	Dobbs Ferry	Bronxville	Tuckahoe	Pelham
New Castle	Hastings-on-Hudson	Mount Vernon	Eastchester	Pelham Manor	

This project involved obtaining new aerial photorgaphy and providing topographic map compilation, ground control surveys, field channel cross sections and bridge geometry for those communities specified. (See also Dutchess County Locations)

ROCKLAND COUNTY:

Piermont	Clarkstown	Grandview	Haverstraw(Vlg)	West Haverstraw	Hillburn
Orangetown	South Nyack	Haverstraw (Town)	Stony Point	Pomona	Sloatsburg

New aerial photography was obtained at a scale of 1" - 1600'. Ground control was established for proper spatial orientation of the photography. Elevation reference marks were established on structures or other permanent objects, in and near flood plane of streams studied in detail.

PROJECT HISTORY

FLOOD PLAIN MAPPING (FEDERAL FLOOD INSURANCE STUDIES)

MARYLAND
WICOMICO, TALBOT, QUEEN ANNE'S COUNTIES:
Mapping of approximately 900 miles of coastline for the Maryland Department of Natural Resources: Scale of Photography 1" = 1000', Mapping at a scale of 1" = 600' with 2' contour intervals. Delineated contours along all coastal reaches to an elevation of 12' above mean sea level.

TOPOGRAPHIC MAPPING FOR FLOOD PLANE STUDIES WAS PROVIDED FOR NUMEROUS COMMUNITIES, AND HUNDREDS OF STREAMS AND TRIBUTARIES IN THE FOLLOWING STATES:

NEW JERSEY

VERMONT

NEW HAMPSHIRE

CONNECTICUT

RHODE ISLAND

SECTION 3

QUALIFICATIONS OF STAFF

3.1 STONE & WEBSTER ENGINEERING CORPORATION

The following resumes represent the typical level of experience of engineering and geologic personnel who would be available to perform inspection of drilling, sampling, and field testing activities. The selection of personnel for a specific project would be based on the subsurface conditions anticipated. Resumes of selected personnel would be forwarded to NED for approval.

Sites where soils predominate and are of most significance would be staffed, in general, by soil engineering personnel, while sites with complex or difficult rock conditions would be staffed by geologists. We have included the resumes of two geologists and two geotechnical engineers that are representative of the personnel to be assigned to this work. These personnel would be selected from the Geotechnical Division which presently numbers in excess of 50 personnel.

Personnel are not only knowledgeable of the technical requirements, but also are experienced in proper documentation and Quality Assurance procedures. The resume of the Project Manager, Mr. J Lyndon Rosenblad, is also included.

J. Lyndon Rosenblad — Project Manager

QUALIFICATIONS

J. Lyndon Rosenblad is an Assistant Chief Engineer in the Geotechnical Division of Stone & Webster Engineering Corporation (SWEC). Dr. Rosenblad has over 20 years of professional engineering experience in the geotechnical field, including more than ten years in engineering management. He has had extensive experience and responsible charge of the geotechnical engineering and design for major projects. At SWEC, he has worked on major hydroelectric projects in the geotechnical field including rock and soil mechanics, engineering geology, foundation engineering, design and construction monitoring of earth and rock structures, and design and construction monitoring of structures in and on earth and rock. Specific projects include the Rock Island Hydroelectric Project in Washington; North Anna Nuclear Power Plant, Units 3 and 4 in Virginia; Oswego Steam Station, Units 5 and 6 in New York; Wyodak Steam Staion in Wyoming; and the Seboyeta Pumped Storage Project in New Mexico. He has conducted geotechnical site studies for several nuclear and fossil power plants and has been in responsible charge of the geotechnical engineering of additional new construction or remedial work at many dams. He has provided consulting services for controlled blasting, blast monitoring, rock excavation and support, and feasibility of large underground caverns for various purposes.

As Assistant Chief Engineer, he provides supervision, senior review, technical direction, and management of engineering and geological personnel involved in the geotechnical engineering aspects of major civil engineering projects and power plant developments. This responsiblility also includes budget planning and management; recruiting, hiring, and project assignment of technical staff; manpower forecasting, cost estimating, and planning for potential projects. In his career at SWEC, Dr. Rosenblad has served in technical positions of increasing responsibility. Specific responsibilities have included the design of tunnels and support systems, surface rock excavation, blasting procedures and methods, blast monitoring vibration analysis, design of earth and rockfill dams, ground water control, and anchorage of existing large hydroelectric structures.

University of Texas, Austin - B.S. in Civil Engineering
University of Illinois, Urbana - M.S. in Civil Engineering
University of Illinois, Urbana - Ph.D. in Rock Mechanics and Soil Mechanics in Civil Engineering

Registered Professional Engineer - New York, Massachusetts, Texas, Michigan

American Society of Civil Engineers - Member
International Society for Soil Mechanics and Foundation Engineering - Member
International Society for Rock Mechanics - Member

"Pressure Relief Wells, Grouting and Drainage at the Second Powerhouse at Rock Island Dam," Geological Society of America, Annual Meeting, Portland, Oregon, September, 1981 - Co-author

JLR

"Geotechnical Investigations for Feasibility Evaluation of Undergound Powerhouse, Pumped Storage Project," Public Service Co. of New Mexico Internal Report, 1980 - Senior Author.

Richard P. Gillespie Geologist

QUALIFICATIONS

Mr. Gillespie, a Geologist in the Geotechnical Division, joined Stone & Webster Engineering Corporation in (SWEC) July 1974. He has more than 10 years of experience in conducting subsurface and geologic field investigations and analyzing and interpreting field data. He has had extensive experience in geologic mapping and site evaluation studies for nuclear, fossil-fueled, and hydroelectric power facilities in New England and in other states. Mr. Gillespie's experience includes supervision of exploratory boring and grouting operations, blast monitoring, mineral exploration, preparation of geologic reports, analysis of geologic features from aerial imagery, borrow investigations, soils mapping, preparation of geotechnical specifications, and detailed faulting investigations.

University of Vermont, Burlington - B.A. in Geology
University of Vermont Graduate School - M.S. in Geology (Structural Geology)

Vermont Geological Society - Member
Association of Engineering Geologists - Member
Geological Society of America - Member

Relevant Publications - "Superposed Folds in the Southeastern Part of the Hinesburg Snyclinorium," Guidebook for Field Trips in Vermont, New England Intercollegiate Geological Conference, Burlington, Vermont, 1972.

"Structure and Stratigraphy along the Hinesburg Thrust, Hinesburg, Vermont," M.S. Thesis, University of Vermont, October 1975.

Frank P. Verock Geologist

QUALIFICATIONS

Mr. Verock, an Associate Geologist in the Geotechnical Division, joined Stone & Webster Engineering Corporation (SWEC) in September 1973. He has more than 17 years of experience in construction and geotechnical work.

His experience since joining the Geotechnical Division has been in site investigations, piezometer installation, pressure testing, caisson installation, fill placement, blast monitoring, in-situ soil densification, in-situ rock stress measurements, deep geological drilling, field mapping, and preparation of specifications and reports.

Much of Mr. Verock's work was in the Northeast, including supervision of borings for Great Northern Paper in Maine, special geological studies and test boring inspection in Central Massachusetts and Geotechnical related construction activities at the Northfield Pumped Storage Project.

He has previous experience in surveying, grouting, excavation, fill placement, formwork, reinforcing, concrete placement, underground excavation, rock-bolting, and weld inspection.

University of Massachusetts - Civil Engineering
Massachusetts Institute of Technology - Groundwater Seminar
Blasting and Explosives Safety, DuPont Corp. Seminar
Drilling Practices School, Dr. Preston L. Moore

Ronald F. Trudeau — Geotechnical Inspector

QUALIFICATIONS

Mr. Trudeau has 11 years experience at Stone & Webster Engineering Corporation (SWEC) with extensive experience supervising subsurface investigations in the field. He has experience on several projects throughout New England. He also has inspected offshore borings and has supervised installation of piezometers.

In addition to his experience supervising subsurface investigations, Mr. Trudeau has field experience as an engineering liaison during construction, including supervision of soil and rock anchor installation, excavation and backfill operations, pile driving, and blast monitoring.

His office experience includes geotechnical engineering and design, specification, preparation, and report preparation. He has performed stability and settlement analysis and developed subsurface investigation programs.

Northeastern University - B.S. in Civil Engineering

Engineer-In-Training Certificate - Massachusetts

American Society of Civil Engineers - Associate Member

Alan F. Brown Geotechnical Inspector

QUALIFICATIONS

Mr. Brown has more than 4 years experience at Stone & Webster Engineering Corporation (SWEC), both in the field and in the laboratory. He is experienced in describing soil and rock materials and determining their engineering characteristics. He has performed laboratory tests on both soil and rock and has prepared reports.

Mr. Brown's field experience includes inspection of drilling for rock anchors and caissons. He also has experience as a surveyor.

Prior to joining SWEC, Mr. Brown worked for the Geotechnical Branch of the New England Division of the U.S. Army Corps of Engineers.

Northeastern University - B.S. in Civil Engineering
Northeastern University - Candidate for M.S. in Civil Engineering

Engineer-In-Training - Massachusetts

American Society of Civil Engineers - Associate Member
Boston Society of Civil Engineers - Associate Member

Relevant Publication - Installation of Category I Caissons, presented at the American Society of Civil Engineers Spring Convention, Denver, CO, May 1985

3.2 GUILD DRILLING CORPORATION

Guild Drilling Company is staffed by more than 20 drillers who have extensive experience particularly in the New England area. The following listing presents the experience records of selected projects for each of the drillers. This listing demonstrates the depth of experience of Guild Drilling Company. Resumes of the Company principals and supervisors who have overall responsibility for the quality and timeliness of the work are also included. The field activities will be directed by one of these superintendents who will also be available to handle difficult ground conditions or other such situations which necessitate increased expertise. He will direct changes in drilling procedures or equipment to complete the work expeditiously.

GUILD DRILLING CO., INC.

100 WATER STREET
EAST PROVIDENCE, R. I. 02914

TELEPHONE
(401) 434-0750

PERSONNEL RESUMES

Foreman's Name	Years as Driller	Projects Completed
Kenneth Allen	17	Sections II & III MBTA SW Corridor; MBTA Redline Extn. N.E. Electri c Co., Somerset, Mass.; MDC Various sites; Pilgrim I & II, Plymouth,Mass.
Paul Brescia	13	Sections II & III MBTA SW Corridor; MDC various sites; Yankee Atomic, Charlestown, R.I.; Rte. 1, Charlestown, R.I. Bridge, Jamestown, R.I.
Frank Ricci	8	Bridge, Jamestown, R.I.; Sewers, Tiverton, R.I., Rte. 1, Charlestown, R.I.; Hsg. for Elderly, Gloucester, R.I.; Sewers, Warren,R.I.; Hsg. for Elderly, Warren, R.I.
Albert Mason	18	Rte. 146, Sutton,Mass.; Sewers, Tiverton, R.I.; Yankee Atomic Power, Rowe, Mass.; I-93, Littleton, N.H. (2 jobs Urban Renewal, New London,Ct.
David Holley	20	Yankee Atomic, Rowe, Mass. (2 jobs); I-84 Conn.; MBTA Redline Extn.NW; Yankee Atomic, Whittingham, Vt.; Willow Island Dam, Ohio River.
Thomas Paquette	16	Yankee Atomic, Seabrook, N.H.; Willow Island Dam, Ohio River; Sections II & Section III MBTA SW Corridor; Yankee Atomic, Charlestown, R.I. (2 jobs)
John Cota	12	MBTA Redline Extn.NW; Sections II & III MBTA SW Corridor; Yankee Atomic; Charlestown, R.I.; Bridge, Seabrook N.H., RR Bridge, Portsmouth, R.I.
Charles Koehler	21	MDC Sewers, Boston,Mass.; Jamesbury Valve, Shrewsbury, Mass; I-391 Chicopee-Holyoke; Sections II & III, MBTA SW Corridor.
John Holley	2	I-91 Hartford, Greenfield Rd., Montague, Mass.; N.E. Corridor, Montovese Bridge, Branford, Ct.; Meridian St. Sewers, Fall River, Mass.; Monsanto Corp., Springfield, Mass.
George Brouillette	10	Rte. 146, Sutton,Mass.; RR Bridge, Portsmouth, R.I.; Sections II & III MBTA SW Corridor; NE Electric, Somerset, Mass.; MBTA Red line Extn. NW
John Texeira	15	Wilminton, Mass. Sewers; MBTA Redline Extn.,NW; Geological Study, Lancaster, Pa.;MDC Sewers; Sections II & III MBTA SW Corridor
William Dunphy	11	Plymouth Sewers; Scituate Sewers; Geological Investigations; Rutland & Franklin, Vermont; Sections II & III MBTA SWCorridor.

Foreman's Name	Years as Driller	Projects Completed
John Phillips	17	Geological Investigations, Franklin, Vt.; MDC Sewers; Sections II & III MBTA SW Corridor Bridge, Concord, N.H.; Hollis, N.H.; MBTA Redline Extension NW
Michael Fisher	2	I-93 Medford, Mass., Greenfield Rd., Montague, Mass., Jamestown Bridge, No. Kingtston, R.I. Meridian St. Sewers, Fall River, Mass.; Boise Cascade Dam Site, Sheldon Springs, Vt.
Donald Serowick	10	Geological Investigations, Rutland, Vt.; Interceptor Sewer Worcester, Mass.; Algonquin Gas, Freetown,Mass.; Tiverton, R.I. Sewers; Sections II & III, MBTA SW Corridor.
Earl Peterson	29	Seabrook Power Station; I-195 E.Prov.,R.I.; Bridge, Hollis, N.H.; Bridge, Concord, N.H.; Fish Pier, Narragansett, R.I.; Sewers, Tiverton, R.I.
Albert Whitaker	27	Algonquin Gas, Freetown,Mass.; Sections II & III MBTA SW Coiridor; ,BTA Redline Extn; NW; MDC Sewers; Rte. 146, Sutton,Mass.
Francis Dunphy	7	MBTA Redline Extn. NW, Sections III MBTA SW Corridor, Boston,Mass.; MDC Sewers; Boston,Ma. Wilmington,Mass. Sewers
Raymond Eastwood	6	Sections II & III MBTA SW Corridor; Goldberg-Zoino, Bridgewater, Mass; MBTA Redline Extn.; NW, Boston,Mass.
John Halaburda	19	Cove Invest., Narragansett Basin; Boston College; MBTA Redline Ext., NW, Boston,Mass. Mineral Exploration, Vermont Marble; SW Corridor; MNTA; MDC various sites.
Michael Costigan	7	MBTA Redline Extn.,NW; Wilmington,Mass. Sewers; Worcester, Mass. Industrial Park; Fall River Energy Park; SectionsIII MBTA, SW Corridor Conrail Bridge, Tiverton-Portsmouth, R.I.

Charles L. Guild - President Guild Drilling Company, Inc.

QUALIFICATIONS

Mr. Guild is President and Treasurer of the Guild Drilling Company which enjoys the reputation as the largest and most successful soil investigation firm in New England.

Mr. Guild is a member of ASCE, ASTM, SAME, DFI and has been a member of The Moles, a national engineering organization for over 25 years. He is a graduate of Wentworth University in Boston.

He has been Secretary of the Deep Foundations Institute, the Chairman of its Specifications Committee, the Trustee Sponsor of the Codes Committee and is a current DFI Trustee. In November of 1981, he became the first recipient of the Deep Foundations Institute's State of the Arts Award and was recognized as "An individual who as a contractor, engineer, educator, inventor, researcher or equipment manufacturer/supplier, has made exceptionally valuable contributions to the advancement of the State-of-the-Art in the planning, use or installation of Deep Foundations.

In October, 1983, Mr. Guild was highly honored as the recipient at the ASCE's Annual Meeting in Houston, Texas, of the Martin S. Kapp Foundation Engineering Award for excellence in the advancement of the heavy construction industry, specifically to the better understanding of pile foundations and innovative designs of piling and pile driving equipment.

In May of 1984, he received an Honorary Degree of Doctor of Engineering Technology from the Wentworth Institute of Technology in Boston, Mass., in recognition of his contribution to the art of the deep foundation construction.

Eric E. Butler - Vice President Guild Drilling Company, Inc.

QUALIFICATIONS

Mr. Butler has had extensive experience in field exploration, instrumentation installation and pressure grouting projects since 1965 with Guild Drilling Co., Inc; American Drilling & Boring Co., Inc. and C. L. Guild Drilling & Boring Co., Inc. Mr. Butler received his degree in Civil and Highway Engineering Technology from Wentworth Institute in 1965. He has attended seminars and technical meetings dealing with hazardous waste monitoring and drilling fluid technology. Mr. Butler has been a member of experts panels, invited to appear before the National Drilling Contractors Association and The Boston Society of Civil Engineers - Geotechnical Section.

Ronald V. Boyd - Superintendent Guild Drilling Company, Inc.

QUALIFICATIONS

Mr. Boyd came to the Guild Drilling Co. in 1983. He started working in the drilling industry in 1964 with the American Drilling & Boring Co., after which he was employed by the C. L. Guild Drilling & Boring Co., Bay State Drilling Co. and Goldberg-Zoino Drilling Co.

Mr. Boyd has had extensive field experience throughout the New England area with all types of rock coring, soil sampling, grouting, and monitor well projects. He has worked throughout the New England area on many bridge, building, dam, highway, mass transit, and utility projects and hydrology studies.

John M. Rivard - Superintendent Guild Drilling Company, Inc.

QUALIFICATIONS

Mr. Rivard has been with the Guild Drilling Company since 1977 and prior to that with the American Drilling & Boring Co., Inc., since 1971. He received an Associates degree in Civil and Highway Engineering technology from Wentworth Institute in 1967 and a Bachelor of Science Degree in Civil Engineering from New England College in 1970.

Mr. Rivard has had extensive experience in many aspects of rock coring, soil sampling, instrumentation and monitor well projects. He has worked on many highway, bridge, building, mass transit, grouting, mineral exploration, and power plant projects throughout the New England area.

He has attended a grouting seminar sponsored by the Geotechnical Engineering Division of the ASCE. He is a memeber of the ASCE and BSCE.

3.3 GEOD SURVEYING AND AERIAL MAPPING CORPORATION

The following resumes are respresentative of the surveyors who would perform the surveying activities required. Surveyors registered in each New England State are available, if required.

RESUME

WILLIAM J. ROSSETTI, P.L.S.
Project Management/Chief of Surveys
Over 37 years experience in all phases of professional surveying and has been associated with GEOD for 5 years

Education: Northeastern University (Boston) 1973
Civil Engineering/Surveying
Highway Engineering

Active Registration:

Land Surveyor	Massachusetts	#27003	(1974)
Land Surveyor	Rhode Island	#1703	(1975)

Member: Massachusetts Association of P.E. & L.S.
American Congress on Surveying and Mapping

Experience and Qualifications:

Mr. Rossetti has had in excess of 37 years in the surveying and engineering profession and has amassed considerable experience in all aspects and types of surveying projects, many of which have been in conjunction with photogrammetric applications.

His years with the New England Division Corps of Engineers (33+) exposed him to the actual performance of, and subsequent management of, projects involving land surveying for property acquisition, engineering surveys for coffer-dams, jetties, piers, etc., navigational and hydrographic surveying for dredging the majority of waterways throughout the New England States. He has also been extensively involved with numerous civil works projects for the Corps, in addition to all other types of surveys and surveying endeavors undertaken by the Department of the Army.

Mr. Rossetti has been actively involved in developing survey specifications and the administration of survey contracts. As Project Engineer with the New England Corps., Mr. Rossetti was responsible for the following functions:

- Preparation and review of government estimates;
- Preparation and review of contract specifications for hydrographic surveys;
- Preparation and review of contract specifications for topographic surveys;
- Coordination with all pertinent outside interests;
- Provided expert advice to Division elements;
- Computed range layouts, plotted & reviewed pre-dredge & condition surveys;
- Provided engineering during construction; also pre-construction;
- Prepared and reviewed design memoranda and technical reports;
- Prepared and reviewed project drawings;
- Instructed surveyors, technicians and draftspersons;
- Supported Affirmative Action Plan for the Division by exhibiting the spirit of the Division in daily operations and contacts and reporting to the Section Chief opportunities for exercise of the AAP when evident

Project Areas:

Cape Cod Canal Rock Removal	Connecticut River Dredging
Portland Harbor Dredging (Maine)	Gloucester Dog Bar
Wallfleet Harbor Dredging	Lynn Harbor, Massachusetts
Salem Harbor Breakwater	Hampton Harbor Breakwater
	Gloucester Harbor Breakwater

RESUME

VICTOR IWANOW, P.L.S.
FIELD PROJECT MANAGER
17 years experience in all phases of professional surveying

Education: Paul Smith's College - Surveying
U.S. Army - Construction/Topographic Surveyor

Active
Registration: Land Surveyor New York #49609

Experience and Qualifications:

During his association with the GEOD organization, Mr. Iwanow has been Project Manager for field operations on the following projects;

New Jersey Department of Environmental Protection
Green Acres Program
Cedar Creek Mainstream/Cedar Creek Headwaters - 12,000+ Acres
Bass River State Forest Extension - 3,700+ Acres

The above projects involved deed research, field control, calculations and analysis for boundary and acquisition surveys; supervision of the preparation of legal descriptions and finished drafted survey maps.

New York State Electric and Gas Corporation
Supervised all field work for route determination, centerline location, profiles, sag checks, condemnation surveys on hundreds of miles of transmission lines.

Power authority of the State of New York
Horizontal and vertical control for construction of 200-mile long 345 KV trabsmission line.

M.C.I. Telecommunications
Site surveys for microwave towers in the State if New York and Connecticut.

U.S. Department of the Interior
Location surveys for the Appalachian National Scenic Trail throughout the States of New York, New Hampshire, Pennsylvania and Maine.

Village of Walton and Deposit, New York
Boundary surveys of corporate limits of both villages.

Mr. Iwanow has also supervised and surveyed numerous large-trace projects for industrial and commercial clients such as Lake Tunis and Timberland Properties and Mallery Lumber Company in New York State.

RESUME

WILLIAM P. DOWNING, P.L.S.
SENIOR SURVEY TECHNICIAN
29 years experience in all phases of professional surveying

Education: Rutgers University
Newark College of Engineering

Active Registration:

Land Surveyor	New Jersey	#14160
Land Surveyor	New York	#46490
Land Surveyor	Pennsylvania	#SU-016600E

Experience and Qualifications:

Harbour City Development Project, Jersey City, New Jersey (Langan Engineering)
Boundary and Acquisition Surveys

Whitestone Expressway Access Bridge (Ammann & Whitney)
Structural Location for Design

Field and Office Management for survey and mapping of 100± miles of Overhead Transmission Lines in Orange, Rockland and Sullivan Counties, New York for Orange & Rockland Utilities

Research, calculation and resolution of 4,100-acre property in Lacey and Bass River Townships, New Jersey (Green Acres Program - N.J.D.E.P.)

Research, calculation and resolution of 11,075± acres in Berkeley and Lacey Townships, Ocean County, N.J. - Property Acquisition Surveys in connection with the Green Acres Program (N.J.D.E.P.)

Property survey, topographic and site plan; construction layout for 250-acre sand and gravel quarry plant at Hardyston, New Jersey

Pequest Fish & Wildlife Preserve, Warren County, New Jersey
28 Parcels totaling ± 1,300 acres (N.J.D.E.P.-Green Acres)

Allaire/Manasquan Projects, Ocean/Monmouth Counties, New Jersey
100 Parcels totaling ± 800 acres (N.J.D.E.P.-Green Acres)

Six Mile Run Project, Somerset County, New Jersey
97 Parcels totaling ± 430 acres (N.J.D.E.P.-Green Acres)

Mr. Downing has had considerable and extensive experience in the coordination of field and office procedures during his 29 years as a professional surveyor.

GEOD

SECTION 4

CAPACITY OF FIRM TO PROVIDE ADEQUATE EQUIPMENT

4.1 SWEC EQUIPMENT

Equipment to perform in-place density tests will be obtained from the SWEC Geotechnical Laboratory located in Boston. All other equipment will be supplied by SWEC subcontractors as outlined in Sections 4.2 and 4.3.

4.2 GUILD DRILLING COMPANY

The following is a list of drill rigs and other major equipment owned by Guild Drilling Company. In addition to this equipment, Guild has 25 pumps, mud mixers, grouting equipment, packers, and over $500,000 worth of parts and supplies inventory.

DRILL RIGS

CO. #	IDENTIFICATION
1	Acker AD II (Ken Allen)
2	Acker AD II (D.C.Holley)
8	Bombardier w/hand feed
9	Mobil B56 (Texeira)
12	Acker RGT Rig
13	Acker RG Rig
14	CME 75 Truck
15	B40 Mobil
16	Homelite Generator
17	B50 Mobil Truck
18	Acker RG Hercules Hand Feed
19	Generac Generator
24	Mel Sear Steam Cleaner
26	John Deere 350 Dozer
27	Acker RGT Rig
28	Acker RG - Hercules Hand Feed
29	Gregory Steam Cleaner
31	CME 45 Truck
41	CME 55 Truck
42	CME 75 Truck
45	Diedrich D-50 Truck
46	Longyear 34 Truck
59	Joy B-12 on Bombardier 59
60	Longyear 34 - IDW00679
61	Longyear 34 - ID W00807
62	Longyear HC150 - 1DZ0D042
63	Winkie Portable
64	CP Drill (Air)
69	Acker RG - Wisconsin
70	CME 75 on Franklin Log Skidder
84	CME 45 on Bombardier 84
88	CME 750 ATV
97	Monkey - Motorized Cathead
98	Monkey - Motorized Cathead
99	Monkey - Motorized Cathead
105	Joy 22 4 cyl. Ford
106	2 Drum American Hoist
107	Ackher Hillbilly
119	Acker Hillbilly
120	Acker Hillbilly
11	S&H 40 CL Skid on Trailer

4.3 GEOD SURVEYING AND AERIAL MAPPING CORPORATION

The following is a list of surveying and mapping equipment owned or available to GEOD.

INVENTORY: LAND - HYDROGRAPHIC - PHOTOGRAMMETRIC INSTRUMENTATION

FIELD VEHICLES FOR TRANSPORTING CREWS AND EQUIPMENT TO AND FROM JOB SITES:

Chevrolet Suburban Carryalls — Ford Station Wagon
Chevrolet Blazers
Dodge Ramchargers — Supervisory Vehicles

22' Mako Boat	175 h.p. Evinrude Motor/Aux. Motor
16' Boat & Motor	Positive Floatation
12' Boat	Flat Bottom
Motorola Mini-Ranger III	Electronic Positioning Systems
Raytheon 719B	Fathometer, depth sounder
Raytheon 719C	Fathometer, depth sounder
KERN DM501	Electronic Distance Measuring Devices
Laser Ranger	Electronic Distance Measuring Devices
Hewlett-Packard 3800 (Power Pac)	Electronic Distance Measuring Devices
Topcon "Guppy"	Total Station (EDM & Theodolite)

Complete traversing sets for all Electronic Distance Metering Equipment

WILD T-1A	Theodolites
KERN DKM2	One-second Theodolites
PATH	20-second Transits
LIETZ	20-second Transits
GEOTEC	20-second Transits
PARAGON	30-second Transits

Complete sets of Transit Legs (Tripods)

GEOTEC	Automatic, self-leveling levels
ZEISS Ni-2	Automatic, self-leveling levels

Complete sets of Level Legs (Tripods)

KERN	tripods with centering bar

KERN DSR-11 analytical plotting system/interfaced with "Maps 200" Digitizing System
KERN PG-2-AT with Digitizer, DC2 and Hewlett-Packard Interface
KERN PG-2-AT (DC2B) Automatic Stereoplotting Systems
K&E 3-Projector Stereoplotter with SIA & Vacuum System

BAUCH & LOMB Zoom Stereo & Transfer Scope
KELSH K-490 Terrestrial Photogrammetric Camera and equipment
KELSH K-470 Terrestrial Photogrammetric Camera and equipment

Aircraft Avaliable: Cessna 180, Cessna 206, Cessna 310, Piper Apache, Cessna 411

Aerial Cameras Available: WILD RC-8, WILD RC-9, WILD RC-10, ZEISS 15/23
Calibration Reports Submitted upon request.

SECTION 5

SAFETY RECORD

SWEC has a well-established corporate safety program that has achieved one of the best safety records in the construction industry. This program has the active participation of corporate management which sets goals, policies and procedures, as well as conducts safety audits. SWEC used its successful corporate policies to develop specific project safety requirements that comply with all applicable federal, state, and local safety rules and regulations. With respect to our safety record for Geotechnical Exploratory work, SWEC has not had any lost-time accidents in the last two years. Overall, in the last eight years, SWEC has not had a totally disabling injury or fatality in more than 155 million man-hours.

SECTION 6

LOCATION OF FIRM

SWEC, located next to South Station in downtown Boston, is approximately 10 miles from NED's Waltham office.

SECTION 7

PAST EXPERIENCE WITH NED

SWEC has been awarded the following contracts by NED:

CONTRACT	CONTRACT NO	TYPE OF CONTRACT	AMOUNT
Update of Cost Estimates-Dickey Lincoln	DACW-33-80-C-0021	Fixed price	31,650
Noise Impact Study Dickey-Lincoln Project	DACW-33-77-C-0007	Fixed price	14,400
Passamaquoddy Tidal Study	DACW-33-79-M-0149	Fixed price	2,500

SECTION 8

VOLUME OF WORK PREVIOUSLY AWARDED BY NED WITHIN THE LAST FIVE YEARS

SWEC has not received any awards from NED within the last five years.

SECTION 11

REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF OFFERORS

PART IV - REPRESENTATIONS AND INSTRUCTIONS

SECTION K - REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF OFFERORS

1. CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985) 52.203-2

(a) The offeror certifies that --

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory --

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above

M. A. Rosen

Vice President

(insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

2. CONTINGENT FEE REPRESENTATION AND AGREEMENT (APR 1984) 52.203-4

(a) Representation. The offeror represents that, except for full-time bona fide employees working solely for the offeror, the offeror --

(Note: The offeror must check the appropriate boxes. For interpretation of the representation, including the term "bona fide employee," see Subpart 3.4 of the Federal Acquisition Regulation.)

(1) [ ] has, [X] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [ ] has, [X] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(b) Agreement. The offeror agrees to provide information relating to the above Representation as requested by the Contracting Officer and, when subparagraph (a)(1) or (a)(2) is answered affirmatively, to promptly submit to the Contracting Officer --

(1) A completed Standard Form 119, Statement of Contingent or Other Fees, (SF-119); or

(2) A signed statement indicating that the SF 119 was previously submitted to the same contracting office, including the date and applicable solicitation or contract number, and representing that the prior SF 119 applies to this offer or quotation.

3. TYPE OF BUSINESS ORGANIZATION (APR 1984) 52.215-6

The offeror or quoter, by checking the applicable box, represents that it operates as [X] a corporation incorporated under the laws of the State of Massachusetts, [ ] an individual, [ ] a partnership, [ ] a nonprofit organization, or [ ] a joint venture.

5. SMALL BUSINESS CONCERN REPRESENTATION (APR 1984) 52.219-1

The offeror represents and certifies as part of its offer that it [ ] is, [X] is not a small business concern and that [ ] all, [X] not all supplies to be furnished will be manufactured or produced by a small business concern in the United States, its possessions, or Puerto Rico. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the size standards in this solicitation.

6. SMALL DISADVANTAGED BUSINESS CONCERN REPRESENTATION (APR 1984) 52.219-2

(a) Representation. The offeror represents that it [ ] is, [X] is not a small disadvantaged business concern.

(b) Definitions.

"Asian-Indian American," as used in this provision, means a United States citizen whose origins are in India, Pakistan, or Bangladesh.

"Asian-Pacific American," as used in this provision, means a United States citizen whose origins are in Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the U.S. Trust Territory of the Pacific Islands, the Northern Mariana Islands, Laos, Cambodia, or Taiwan.

"Native Americans," as used in this provision, means American Indians, Eskimos, Aleuts, and native Hawaiians.

"Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria and size standards in 13 CFR 121.

"Small disadvantaged business concern," as used in this provision, means a small business concern that (1) is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged, or a publicly owned business having at least 51 percent of its stock owned by one or more socially and economically disadvantaged individuals and (2) has its management and daily business controlled by one or more such individuals.

(c) Qualified groups. The offeror shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Asian-Indian Americans, and other individuals found to be qualified by the SBA under 13 CFR 124.1.

7. WOMEN-OWNED SMALL BUSINESS REPRESENTATION (APR 1984) 52.219-3

(a) Representation. The offeror represents that it [ ] is, [X] is not a women-owned small business concern.

(b) Definitions.

"Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria and size standards in 13 CFR 121.

"Women-owned," as used in this provision, means a small business that is at least 51 percent owned by a woman or women who are U. S. citizens and who also control and operate the business.

8. WALSH-HEALEY PUBLIC CONTRACTS ACT REPRESENTATION (APR 1984) 52.222-19

The offeror represents as a part of this offer that the offeror is [X] or is not [ ] a regular dealer in, or is [ ] or is not [ ] a manufacturer, of, the services offered.

9. CERTIFICATION OF NONSEGREGATED FACILITIES (APR 1984) 52.222-21

(a) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(b) By the submission of this offer, the offeror certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its

employees to perform their services at any location under its control where segregated facilities are maintained. The offeror agrees that a breach of this certification is a violation of the Equal Opportunity clause in the contract.

(c) The offeror further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will --

(1) Obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the Equal Opportunity clause;

(2) Retain the certifications in the files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES.

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract under which the subcontractor will be subject to the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

10. PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (APR 1984) 52.222-22

The offeror represents that --

(a) It [X] has, [ ] has not participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the clause originally contained in Section 310 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114;

(b) It [X] has, [ ] has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

11. AFFIRMATIVE ACTION COMPLIANCE (APR 1984) 52.222-25

The offeror represents that (a) it [X] has developed and has on file, [ ] has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the

Secretary of Labor (41 CFR 60-1 and 60-2), or (b) it [ ] has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

12. CLEAN AIR AND WATER CERTIFICATION (APR 1984) 52.223-1

The Offeror certifies that --

(a) Any facility to be used in the performance of this proposed contract is [ ], is not [X] listed on the Environmental Protection Agency List of Violating Facilities;

(b) The Offeror will immediately notify the Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the Offeror proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and

(c) The Offeror will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

13. AUTHORIZED NEGOTIATORS (APR 1984) 52.215-11

The offeror or quoter represents that the following persons are authorized to negotiate on its behalf with the Government in connection with this request for proposals or quotations:

Name: M. A. Rosen	Name: S. P. Werzanski
Title: Vice President	Title: Manager, Project Commercial Services
Tel. No.: (617)589-2664	Tel. No.: (617)589-5319